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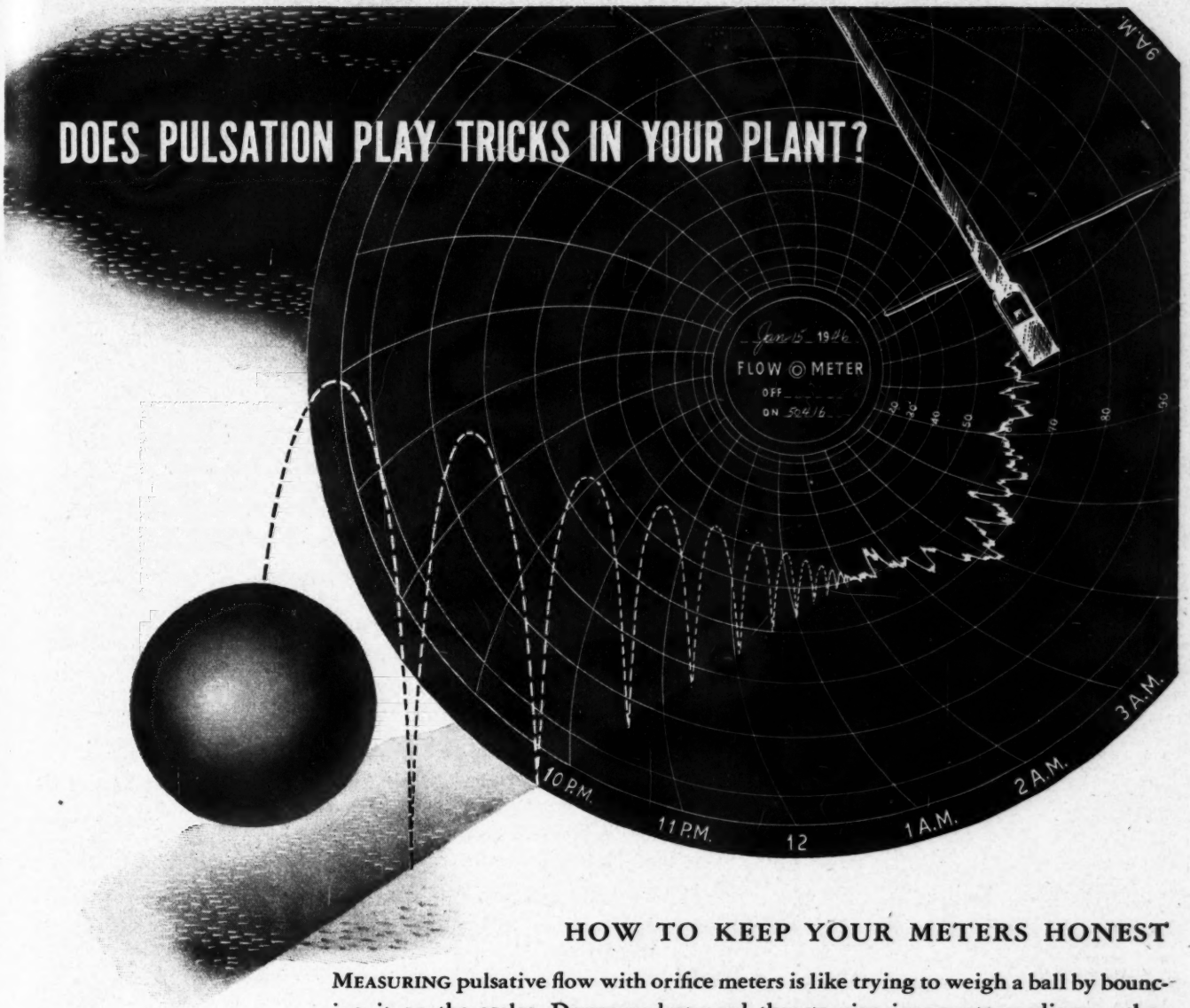

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Twenty-Second Year of Publication

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ELLIOTT TAYLOR, Editorial Director
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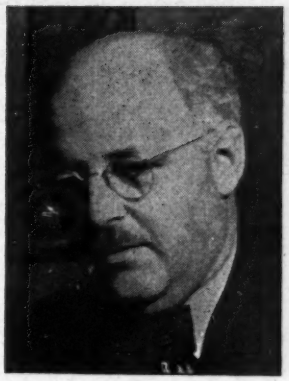
March, 1946. Volume XXII. Number 3. G A S is published monthly by Jenkins Publications, Inc., 1709 West Eighth Street, Suite 320, Los Angeles 14, California. Subscription price: United States, Canada, Mexico, Cuba, South and Central American countries (in advance), 25 cents the copy; $2.00 per year. All other countries, $3.00 per year. Acceptance under the Act of June 5, 1934 was authorized February 26, 1946. Member: Audit Bureau of Circulation; Associated Business Papers, Inc. Publishers: BUTANE-PROPANE NEWS; Handbook BUTANE-PROPANE GASES; THE BOTTLED GAS MANUAL, WESTERN METALS.

THERMALLY THINKING

By ELLIOTT TAYLOR, Editorial Director



Krug Will Do

THE nomination of Julius A. Krug to be Secretary of Interior is an appointment that may well be regarded with favor by the entire gas industry. We know that it will meet with the approval of that rather sizeable segment of the fraternity who were obliged to be frequently in Washington during the war years, and who had the opportunity of becoming acquainted with the big boy-wonder who climbed up from chief power consultant in OPM (the Office of Production Management, remember ?) in 1941, to head of the War Production Board in 1944.

In practically every job that Krug held during this period he was in some position of administrative authority over gas industry operations and controls. Although he was by training and experience a public ownership-electric power expert, none of the many gas industry executives who worked with him has ever reported the slightest bias on his part in favor of electricity over gas, nor has he ever used his position to attempt to extend federal suzerainty over either gas or electric utilities.

Krug's private philosophy may be one of public ownership of public utilities; we do not know. But we do know that at no time was he ever identified with the persistent proselyters for social experiments who infested the Capitol during the Roosevelt Terror.

He was head of the War Production Board's Office of War Utilities in September 1943 when it became necessary for the WPB to put Leland Olds of the Federal Power Commission in his place in order to bring to an end the under-cover jurisdictional dispute over the authorization of emergency pipe lines. The Commission never quite got over its pique at having wartime control over electric power and gas transmission lodged with the WPB, and it was not until a written document was promulgated, to be signed by the then WPB Chairman, Donald Nelson, and Olds of the Commission, that the sensible delineation of authority that all recognized as necessary became part of the working procedure of the FPC.

It is also well known that the Interior Department, in the days of Harold Ickes, viewed with disfavor amounting to scorn the antics of the FPC in attempting to tighten its hold in natural gas affairs even in the face of the war emergency.

At present, and with the dissolution of the old Petroleum Administration For War, the affairs of the natural gas industry are only remotely related to the Interior Department. But under the Government Agency Reorganization bill President Truman has been granted broad powers to reorganize many agencies, including the FPC. We certainly don't believe that the old pre-Ickes concept of the Interior Department, as an agency that had little to do but protect the nation against the Indians and collect coal statistics, will be a fitting challenge to the capabilities and the capacities of Julius Krug.

It is highly probable that with a power expert in the cabinet, the administration of the various Federal power yardstick projects will be brought under his jurisdiction in the Interior Department. And since the FPC is also subject to reorganization under the bill, it may well be that the powers and functions conferred on the Commission by both the Federal Power Act of 1935 and the Natural Gas Act of 1938 will be considered for transfer into the Department of the Interior.

So, if in the course of human events, as the document says, it should come about that the transfer of natural gas jurisdiction from FPC to Interior is effected, we believe that the industry will be accorded more understanding, even though firm, treatment at the hands of Secretary Krug than it has ever known under the indecisive, uncertain and totally unpredictable policies of the present Federal Power Commission.

Fuel As A Factor

THE thesis that gas fuel alone is a magnet of sufficient attractive power to pull all kinds of industry into an area took a lacing at the hands of Ernest O. Thompson of Texas Railroad Commission when he testified recently before the FPC in its Houston hearings.

The Commissioner, one-time mayor of Amarillo, was answering questions on his first direct cross examination when he launched into a reminiscence of the early days of the Panhandle field, and the laudible ambition of his town to make itself a big industrial center as the result of ar. abundance of cheap fuel.

"For years we tried to give gas away," he said, "to anyone who would come there and put in an industry. We didn't have much luck at it. We spent $60,000 in advertising it—free gas for anybody who would employ 50 people, anybody bringing in industry, free gas for a period.

"One smelter came, but he didn't even see our ad. He just came there on his own hook. We got one smelter out of it. We had the biggest gas field in the world and we thought surely we would have smoke stacks all over town. We worked hard toward it, but we didn't get them."

Unquestionably an adequate supply of inexpensive fuel is a factor in the locating of industry. But the contention of some of the local producing state politicians before the FPC, that it is a major, indeed almost the only factor, is not borne out by experience. As far as we have been able to discover about the only industrial process that will consistently follow the gas supply around is the business of manufacturing carbon black. That is a type of utilization that is almost universally regarded by producers as a stop-gap load—a poor market that can be served only until something better comes along.

Demobilized

AS we scan the various handouts and dispatches upon which we rely in forming our flexible opinions, we are lately impressed by the high percentage of military titles that seem to have clung on *post bellum*, tenaciously pursuing their bearers into the hitherto untitled anonymity that is presumed to be characteristic of democratic American citizens.

Therefore, as our contribution to the return to normalcy, we propose now to demobilize our own private army of colonels, majors, captains and leftenants, restoring them to the simple dignity of citizenship's highest rank, with its appellation of just plain mister.

In the grim battles of peace that lie ahead, the burden of an implied valor should not be allowed to rest on the shoulders of those who may some day prudently decide that the battles are not always to the strong.

And should any of the officers and gentlemen, who have climbed to their respective ranks through sheer merit, feel slighted at the termination of our military designations, we can solace them best by quoting the Gilbert and Sullivan classic, "The Gondoliers":

In short whoever you may be,
To this conclusion you'll agree
When everyone is somebody,
Then no one's anybody.

Natural Gas or National Scandal

IT is a matter of regret that the Surplus Property Administration's report and recommendations on the disposal of the war emergency or "Big Inch" pipe lines had to be pitched to a tone of querulous left wing political whining when it could have been based on a substantial market and engineering study that might have pointed the way to the best solution of problems posed by the existence of this $145 million asset that nobody dares to touch.

After rambling at great length, the report concludes that "There appears to be no reason that Big Inch should not continue in the service (oil) for which it was built in competition with any other form of transportation." The report does not appear to have any definite idea of how oil could be obtained to keep the line in economical operation, other than to state that there is "west Texas crude" and "Big Inch could tap other fields."

Months ago, in hearings before the Surplus Property Committee of the Senate Committee on Military Affairs, a petroleum industry committee—composed largely of members of the old Petroleum Industry War Council of PAW days—presented testimony opposing the further use of the two lines in the movement of either crude oil or petroleum products. These oil men, who were familiar with every detail of the war emergency lines, from their construction through to the termination of their useful operation in petroleum service, want no part of them for oil carriers, for the simple reason that they can't compete with tankers in either flexibility or economy of operation.

The present recommendations of the SPA, in order of their desirability are: (1) sell the lines to private bidders in the oil industry who would be willing to operate them as common carriers and at a regulated rate of return on their investment; or (2) attempt to negotiate leases for their operation under the same conditions as the above, (3) put the government in the pipe line business as a common carrier and (4) "Disposal for conversion to natural gas will be favored only if it proves impossible to keep the lines in petroleum service. It will be considered then if the national security appears to be otherwise adequately protected."

While the proposal to convert the lines to natural gas carriers is regarded as a poor fourth prospect by the Surplus Property Administrator, there is reason to believe that it may be the only alternative left to the administration after it has tried and failed to recruit prospects for either its selling or leasing proposals from the oil industry and after Congress has turned down, as it almost certainly will, the suggestion that the goverment embark in the oil transportation business as a common carrier.

But the apathy or even the hostility of the petroleum industry toward any further use of the two big lines to carry its product is by no means shared in natural gas circles.

Long before the disposal procedure had been decided upon, there was a lively interest in the possibility of using the lines as an economic link between the fuel hungry Philadelphia, New York and New England markets and the glutted and satiated areas in the southwest, where millions of cubic feet of natural gas are being blown into the air every day, an inevitable accompaniment of the production of oil in certain types of producing fields.

It is currently accepted in the oil industry that as high as a billion cubic feet of thousand Btu gas per day is being blown to the air, flared and wasted in producing areas along or near the Texas end of the Big Inch lines. This is more than enough gas to supply the present daily consumption in all of the areas around Philadelphia, New York, northern New Jersey and New England combined.

That any government agency purporting to consider the broadest aspects of national welfare should ignore the potentialities of the Big and Little Inch lines in making some inroads on this waste is almost beyond belief.

It is heartening to note that further hearings on this matter will be held before Congress permits the SPA's recommendations to become public policy. Now would be the opportune time, in our opinion, for a natural gas transmission company, or a group of companies, to present simultaneously (1) a bona fide declaration of intention to bid on the lines, to the RFC and (2) an application for a certificate of public convenience and necessity before the FPC, and (3) a public announcement to the press of the metropolitan areas in the East which have long been waiting for gas, advising them that, barring the further intervention of political obstructionists, "Natural Gas is Coming".

Once the light of public understanding is thrown on the question of the disposition of the government-owned pipe lines we are of the opinion that they will shortly become either natural gas carriers or the subject of a national scandal.

Highlights

• Possibility of a strike among employees of Southern California Gas Co. was averted early in March when the Utility Workers of America, CIO and the company settled their wage negotiations with agreement upon an increase of $34.10 per month retroactive to Nov. 1 for all employees in classifications represented by the union. As a result of the negotiations, the company's contract with the union, which would have expired May 1, has been extended to March 1, 1947.

• Col. Ernest Thompson of the Texas Railroad Commission foresees a possibility of a 10 cents per Mcf price for natural gas in the field within the next three years. The price in some Texas areas, he points out, has doubled in the past four years, rising from a general average of about 2 cents per Mcf to 4 cents per Mcf. As market demand increases, the price will rise, stated Thompson who favors exportation of Texas gas to all possible markets.

• Humble Oil and Stanolind Oil and Gas Co.'s will spend nearly $9 million to conserve casinghead gas now being flared in Texas.

• The Federal Power Commission now has jurisdiction over approximately 100 interstate pipe lines. Nine major applications involving construction costs of over $133 million are now awaiting FPC action.

• Minnesota can have an iron processing as well as an iron mining industry if natural gas can be piped to Northern Minnesota, according to statements made before the Federal Power Commission by James W. Clark, executive director of the Minnesota Resources Commission.

• Orders for Servel gas refrigerators are being taken only subject to a price revision at the time delivery is made, according to word that went out to dealers and salesmen as the Servel plant in Evansville, Ind., was forced to shut down an account of lack of steel.

• The Transcontinental Gas Pipe Line Co. has offered to purchase the Big Inch, Little Big Inch, and Southwestern Emergency Pipe Lines from the War Assets Corp. for $40 million. Another $40 million will be neded in converting the lines. If unsuccessful in purchasing the surplus pipe lines, the company plans to construct a 26-in. welded steel line to carry 300 MMcf daily from Texas to Pennsylvania, New Jersey and New York. It plans to build a second 26-in., $80 million line as the market develops. Claude A. Williams of Austin, Texas, is president of the company.

• Tennessee Gas and Transmission Co. has applied to FPC for permission to enlarge its pipe line system between Texas and West Virginia to raise its daily capacity from the present 264 MMcf to 381 MMcf. Cost of the construction, which will include 410 miles of 26 and 24-in. line, three new compressor stations, and 18 new compressor units totalling 19,000 hp in existing stations, will cost $29.5 million.

• The American Gas Association Testing Laboratories last month received the commendation of Dr. Vannevar Bush, director of the Office of Scientific Research and Development, for an outstanding contribution to the war effort.

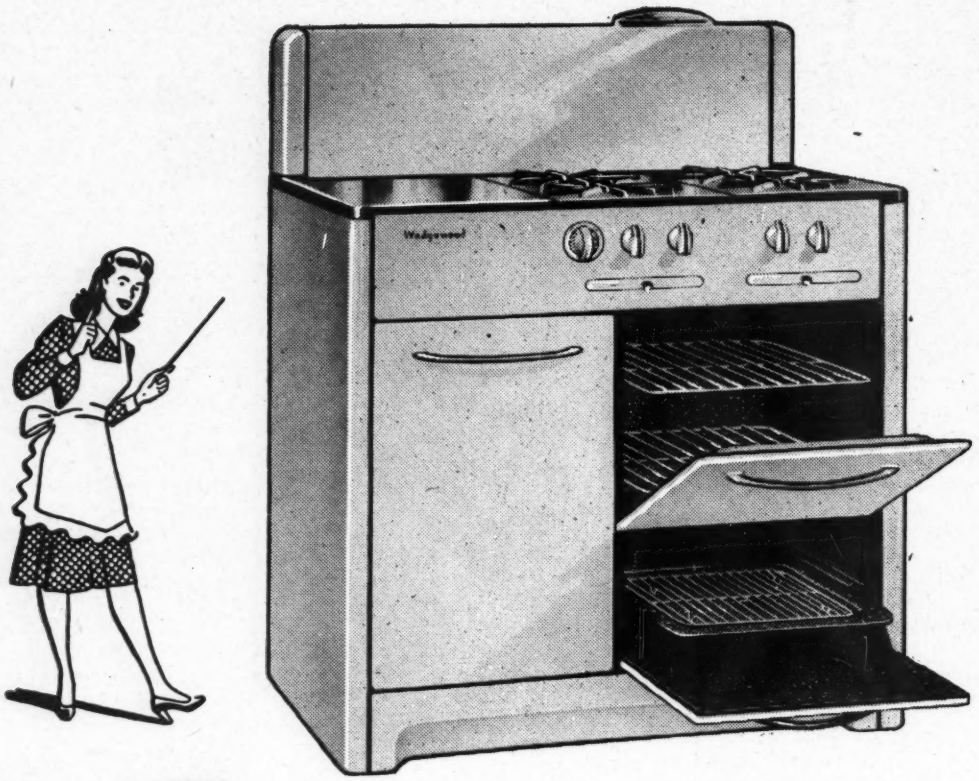
• Plans are being formulated for the construction of a $25 million plant in Northern Alberta, Canada, for the extraction of gasoline from natural gas.

• FPC hearings in Washington on applications of El Paso Natural Gas, Southern California Gas and Southern Counties Gas Co.'s to build a Texas-California natural gas line were adjourned to be resumed in California, probably Los Angeles, in late March or early April. To date, no opposition has been filed.

• A petition by coal interests for a rehearing on the FPC's authorization for construction of a natural gas pipe line to serve Nashville, Tenn., has been rejected by the FPC. The coal interests had based their request for rehearing on the grounds that bringing gas into Nashville had not been locally authorized and because the state charter did not grant such right.

• Judging from his performance as director of the War Production Board's Office of War Utilities, and later as WPB chairman, the private utility interests can expect fair play from J. A. Krug, newly appointed Secretary of the Interior. (See page 19).

• The Reconstruction Finance Corp. is negotiating a contract with Williams Bros. of Tulsa to take custodial charge of the War Emergency Pipe Lines to maintain them in standby condition, pending their final disposition.



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General view of The Post War House showing U-shaped house and outdoor living quarters. The clothes lines are in a clean, enclosed space at left of the barbecue. At lower left of grass area is a small pool. Note sunken garden and raised flower beds.

GAS DOES the FOUR JOBS

in the Post War House

GAS does the four big jobs in The Post War House recently completed by Kaiser Community Homes on Wilshire Boulevard in Los Angeles to give the home hungry public a first hand glimpse of some of the things that it can look forward to in the home of tomorrow. When the house was opened for public inspection on March 3, some 1600 people reviewed the many new wonders of what one visitor described as "the most thought provoking house in America."

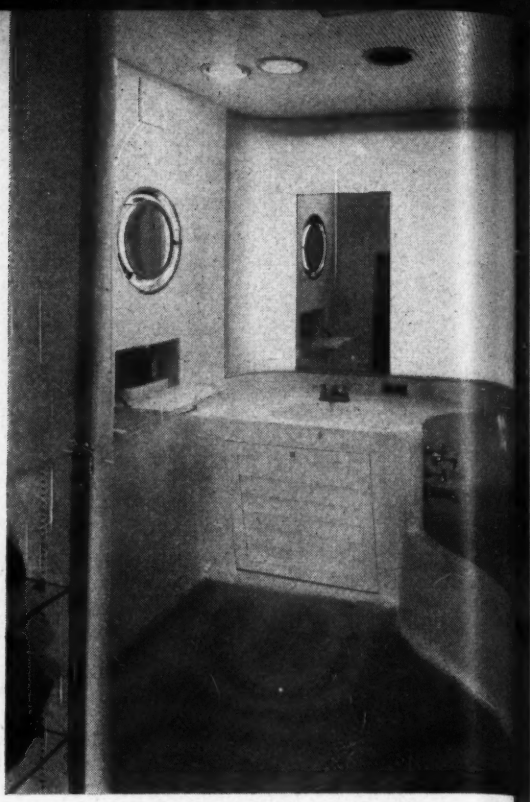
Not a model house in the ordinary sense of that phrase, The Post War House is a house built through research. No expense or labor was spared to obtain and incorporate the latest in design, materials, and equipment. Its purpose is not to decree what the post war home shall be, but rather to bring into the focus of public opinion the very best in post war thought that architects, builders, and manufacturers have to offer.

Fritz B. Burns, builder of several thousand homes in the Los Angeles area and now president of Kaiser Homes, a five-million-dollar corporation organized to build low-cost houses, built The Post War House in collaboration with J. Paul Campbell, his associate of many years. It was financed entirely by these men as a personal contribution toward crystallizing opinions of both industry and public alike and determining to a degree which of the post war building innovations are within reach and which as of today can be relegated to the realm of pure fantasy. The construction techniques will be made available to interested governmental agencies, to builders, and to the public at large.

Joseph H. Schulte, director of the Fritz B. Burns Research Division, toured the United States interviewing manufacturers of building materials and equipment and seeking their most advanced products, many still on the drawing boards. Walter Wurdeman and Welton Becket, architects, designed the house, incorporating the new techniques and materials revealed in the research program.

With new products available for the control of heat and cold from the outside, as well as for treating air within the house, the architects found they were able to enclose space and still take complete advantage of the beauty of the outdoors. With dual glass walls to insulate from the changing climate outside, the patio garden is not only a place for warm weather living, but a constant source of beauty, day and night. The house is built in a broad "U" shape, giving access and visibility to the beautiful gardens and outdoor living facilities in the patio from every room, grouping the

The kitchen desk is the nerve center of the entire house. Controls for lights, radio, telephone, sprinkler and garage door are located here.



View of master bathroom showing tub, glass turret door for shower, concave magnifying mirror, and sunlamp in the ceiling.

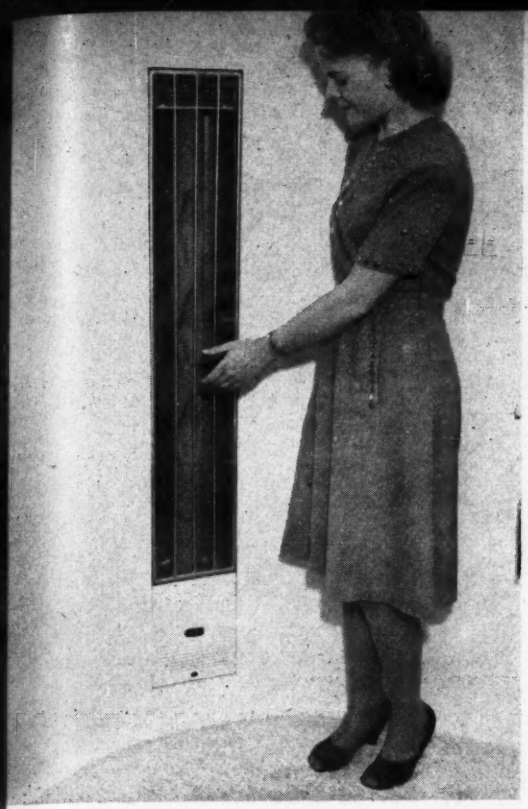
Counter height Servel refrigerator with two doors and two drawers allows minimum loss of cold air and leaves unbroker working surface.

Post War Ho

THE Post War House, on Wilshire Blvd. in Los Angeles, was completed in February and opened to the public March 3, when 1600 visitors reviewed its many wonders. It is not a model house, but was built through research to test public reaction to the very best in post war construction. The

Western Stove Co. gas range has rear burner arrangement providing working space in front. Concealed ventilator intake removes cooking odors.

View of living room, showing radio, phonograph and recorder at left of fireplace and television receiver at the right. Furniture separates to form television theatre.



The bathroom is heated by this Day and Night Co. Panelray vented gas heater which provides instantaneous radiant warmth.

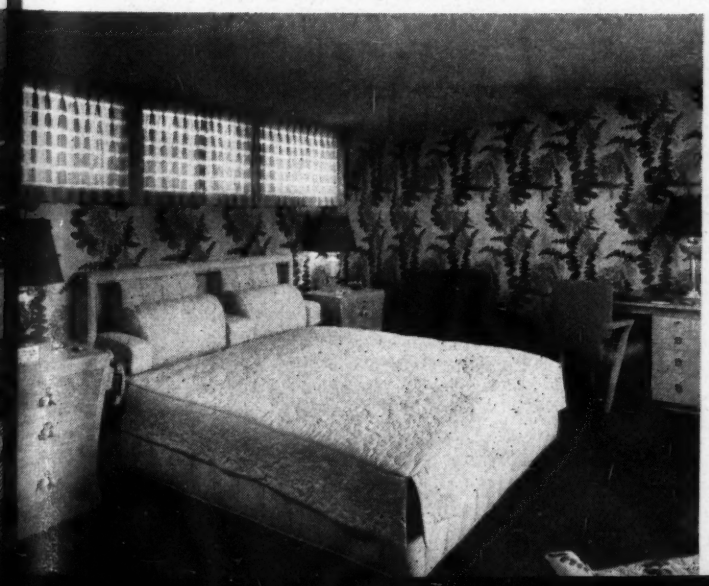
General view of the barbecue showing overhead trellis and food preparation center. A gas igniter serves the charcoal burner.

Photographs

house, built by the Fritz B. Burns Research Division, was carefully designed to combine the latest indoor features with comfortable outdoor living. The accompanying photographs illustrate some of the ultra-modern conveniences, including a number of gas appliances.

This custom built gas oven with two top burners is located in the barbecue section. Not the wood paneling and flagstone hearth.

View of master bedroom showing arm rests on the bed, telephone and master control of all lights, and convenient bedroom writing desk with special lamp.



This small Servel refrigerator, built into the stone work, makes the barbecue section really independent of the kitchen. The patio furniture at left is bronze with white Koroseal pads.

main rooms around it. All furnishings in the house were designed by Bullock's, leading Los Angeles department store. Much effort was expended in coordinating the decorating with the architecture and in selecting the color scheme.

The house is completely air conditioned with Chysler Airtemp packaged air conditioner which provides winter warmth and summer cooling. Minneapolis - Honeywell thermostat controls, utilizing the Moduflow principle, permit even temperature at all times by controlling the height of the gas flame to meet varying outdoor temperatures.

Kitchen Design

The all-gas kitchen was designed for smooth coordination of work centers through the cooperation of the architect, Home Planning Bureau of Southern California Gas Co. and Southern Counties Gas Co., and the kitchen planning service of several well known manufacturers.

The kitchen embodies every feature of modern design for luxurious living, and gas plays an important part in this room. The stove selected is a special four burner gas range designed by Western Stove Co. The four all-porcelain enameled top burners are in line at the back of the stove—a new preference trend — leaving a work space in front, and eliminating the necessity of reaching over any one burner to prepare food on another. Pots and pans are kept out of the reach of children, and this arrangement also makes possible a vent which removes heat, fumes and vapors from cooking. Following a new principle developed by the Gas Appliance Testing Laboratory of the two gas companies, top burners are equipped with saucepan sized disk tops. This new principle provides better heat distribution, and a smoother overall appearance, as well as cleanliness of burners and cooking vessels. Top surface of the range curves into a back panel flush with the wall, then up to the cabinets and the concealed ventilator intake.

A three-speed valve on each burner insures a constant specified heat of high, medium or low. A high, automatic pull-out broiler is on the same level as the oven and may be completely removed for cleaning. The grill and the oven both contain fully automatic lighting with safety pilots.

A new console-type refrigerator was built by Servel Inc., especially for The Post War House. It is table height, leaving the top available for work space and making no break in the counter line of the entire food preparation center. Two doors, side by side, pull down and two drawers under the doors pull out to allow access to the food.

This model was the only one of its kind built by Servel with an approximate capacity of 6 cu. ft., and was installed especially to test public reaction to counter height refrigeration. According to a gas company official the reaction by visitors to the counter-type Servel was most favorable. While some objected to stooping to obtain foods from the box, others pointed out the convenience and ease with which foods can be selected from the pull-out drawers. Still another advantage not at once perceivable to the layman is the fact that the four-door box permits greater retention of cold air, since normally only one section would be opened at a time. Also the drawers when open will retain their cold air which naturally seeks a lower level, whereas when the single door unit is opened, the cold air has a tendency to "spill out" toward the floor.

Two gas water heaters supply hot water to the service and living centers of the house independently. This plan calls for shorter pipe runs to points of use and results in better service and greater fuel economy. A Kaiser hydraulic dishwasher is operated solely by hot water pressure. It washes, rinses and dries the dishes and is self-cleaning and odorless. Gas figures prominently in this operation since it fuels the water heater.

Other features which make the kitchen an ideal work center are the stainless, mar-proof sink top, drain and work surface; garbage disposal unit; rotating circular shelves for pots and pans and roll-type cupboard doors; freezing cabinet; vegetable container with circulating air; automatic laundry and mangle; shoe shining compartment; sewing machine mounted on a swinging door which conceals it when not in use; swinging shelf for the electrical mixer; and housewife's desk with provisions for writing, files, recipes, etc. Communication with all points of the house may be made from this center and controls for the sprinkler system, garage door, telephone, radio, etc., are located near the desk. An automatic package receiver locks when a package is inserted and cannot be reopened from the outside.

Gas Heats Bathroom

Gas is employed in the master bathroom where a full-length radiant infrared Panelray gas heater, product of Day and Night Manufacturing Co., gives instantaneous heat. It is designed on the principle of heating the body rather than the air in the room.

A circular concave mirror, lighted from the rear by a fluorescent lamp, magnifies the face. An electrical shaver and electrical toothbrush, with special heads for various members of the family, are attached to spring cords which are pulled out and go back automatically when not in use. A sunlamp provides a suntan while shaving or applying makeup, and there is a special lamp in the ceiling for drying hair. A compartment for drying hosiery is provided.

A solid glass door leads from the all-purpose room to the barbecue section. The floor of this section is colored cement and the hearth is of flagstone. A custom-built gas oven with two gas burners above provides ample cooking facilities. A small Servel refrigerator makes the barbecue really independent of the kitchen. The patio furniture is bronze with white Koroseal pads and the picnic table is of bleached redwood varnished to match the exterior of the house.

Flush lighting, neon and fluorescent, is used throughout the house. Floodlights in the yard and the greenhouse lights feature special spectrum colored glass which produces a technicolor effect. A continuous electrical outlet strip allows plugging in at any point in the rooms, and special plastic, push-plate light switches require only a slight pressure to operate them.

An inter-room communication system makes it possible to talk with persons in other rooms of the house and there is remote control for the radio and record changer in each room.

The landscaping was designed by Garrett Eckbo, and the general plan has three main elements: the entry garden and auto court, the main garden and the service yard and the working garden. Every detail has been carefully worked out to provide the utmost in comfort, convenience and practicability.

SALES POINTERS ON NEW GAS APPLIANCES

GAS presents in this issue a new feature for the utility and dealer gas appliance salesman, "Sales Pointers on New Gas Appliances." This one-page feature is designed to give the gas appliance salesman an easy-to-read and handy reference data sheet which can be clipped and filed in his portfolio for ready use in talking to the customer about the new or improved gas appliances which will shortly be available. The first sheet in this series deals with the Panelray heater manufactured by The Day & Night Manufacturing Co. Turn to Page 51. The second page in the series is scheduled for the April issue.

GENERAL FEATURES OF THE POST WAR HOUSE

Appliances

• *Gas*—Gas is used for the four major tasks of cooking, water heating, refrigeration and winter air conditioning space heating. The gas appliances used are one console-type refrigerator, one gas range, two automatic gas water heaters, one body-height space heater, and gas jets to ignite the fireplace and charcoal burner. The barbecue section is equipped with one small gas refrigerator and a custom-built gas oven with two top burners.

• *Electricity*—Electricity is used for the lighting; air conditioning; electronic dust collector; radio, remote control, and inter-room communication systems; home recorder; bathroom vent control; television receiver; sunlight lamp; infra-red drying lamp; bacteria-killing sterilamp; sewing center; garbage disposal unit; laundry—dryer and mangle; and electric shaver and toothbrush.

General Construction

• *Exterior*—The walls are California redwood plywood panels constructed so that there are no nail or screw holes on the face of the plywood. It is treated with a special new varnish which brings out the natural color and maintains it for many years. A combination of strip flagstone and wall stone is used for the fireplace and garage chimneys.

• *Roofing*—The roofing is a new type consisting of panels 1 ft. x 8 ft. comparable to large shingles, formed by moulding sheets of bright Alcoa aluminum around pieces of Celotex insulation board. Thick butts provide deep shadow lines, and the roof is doubly heat-resistant since the aluminum surface serves as reflective insulation in addition to the effectiveness of the Celotex board.

• *Ceilings*—All ceilings are insulated with a thick blanket of Balsam wool inserted between the studs and ceiling joists. They are accoustically treated, some with plaster and some with acoustic-celotex perforated tiles of sound-absorbing material.

• *Windows*—Two types of Libby-Owens-Ford thermopane windows are used. The regular thermopane contains a dead air space between two identical panes of glass, providing insulating qualities, and the other is the heat-absorbing thermopane which is similarly made and insulates but also keeps out heat rays from the sun.

• *Air Conditioning*—The house is completely air conditioned with Chrysler Airtemp packaged air conditioner. Minneapolis-Honeywell Moduflow principle thermostats permit even temperature at all times in various rooms. A Westinghouse Precipitron collects dust and foreign particles from the air by electronics, and since particles of pollen are removed from the air, it may even offer relief from hay fever and asthma.

• *Doors*—Music and conversation in the living room is kept from the bedroom by means of soundproof, warp-proof sliding doors, some containing fibre-glass and some perforated wood cores. The doors were manufactured by the Mengel Co.

• *Walls and Partitions*—A translucent corrugated glass partition separates the entry from the living and dining rooms. To the left of this partition is a wardrobe, and to the right, miniature inside gardens. One wall of the combined living and dining rooms is a series of large picture windows with heavy glass doors leading into the patio at both ends. A large flagstone fireplace in the living room has ornamental decorative wood and plastic grill work extending from floor to ceiling. Flagstone with fluorescent lights playing on flowers forms the background for the radio and television sections. Shelves for books and record albums extend the full length of one wall under high windows. The bedroom walls are covered with Koroseal, a rubberized plastic material similar to wall paper with designs impregnated into it. Marks may be removed by wiping with a damp sponge.

Lighting

• *General*—Flush lighting, operating on the same principle as sealed-beam headlights, is used throughout the house, eliminating the old-fashioned light bulb. Westinghouse slim-line fluorescent lighting is used in the living room.

• *Bookcases*—Neon tubes of light in the bookcases can be regulated to low, medium or bright by turning a dial.

• *Closets*—The kitchen cabinets and closets are lighted by continuous strips of tube lighting, both fluorescent and neon, controlled by opening the doors.

• *Sterilamps*—Ultraviolet rays of a special germ-killing wavelength guard toothbrushes in the bathroom and are mounted over a utensil drawer and a cabinet containing pots and pans in the kitchen.

• *Spectrum Lenses*—A new type of bulb containing spectrum colors in the glass which brings out the colors in flowers and materials, is used in the greenhouse lights and in the floodlights outside the house.

• *Light Switches*—The plastic push-plate switches contain a tiny bulb which glows at night. A slight pressure on the plate operates the switch.

• *Bath Tub Lighting*—A wide panel of translucent Plexiglas in front of the window over the tub permits a diffused light in the daytime, and at night artificial light comes from the same direction, giving a similar effect.

• *Mirror Light*—A circular fluorescent lamp lights a concave magnifying bathroom mirror from the rear. This lamp is entirely concealed behind the mirror.

• *Outdoor Lighting*—An unusual decorative effect is provided by two circline lamps in lattice work over the barbecue pit in the garden. They are protected from the weather by an ingenious housing arrangement.

• *Sun Lamp*—A sun lamp with a suntanning strength three times that of the midsummer sun, is installed over the wash basin and adjacent mirror in the bothroom.

Automatic Control Features

• *Radio and Remote Control*—Two complete radio receivers and amplifiers are installed in a compartment near the fireplace in the living room. They provide both amplitude and frequency modulation reception on the same dial. The radio receiver was modified to operate as a remote controlled receiver. There are five loudspeakers throughout the house, and phonograph records, wired music or standard radio programs may be selected from each room. The remote control unit, 4½ in. square, is built into the wall and consists of an 11-position selector knob and five push buttons. There are six remote control stations in the house. Three small built-in radios are permanently installed in the master bathroom, the hobby room and the hobby shop.

• *Phonograph and Home Recorder*—A complete professional recorder is installed above the radio equipment in the living room. A Webster automatic record changer is connected to the radio installation and can be operated through the radio remote control system. The changer is located in a special compartment.

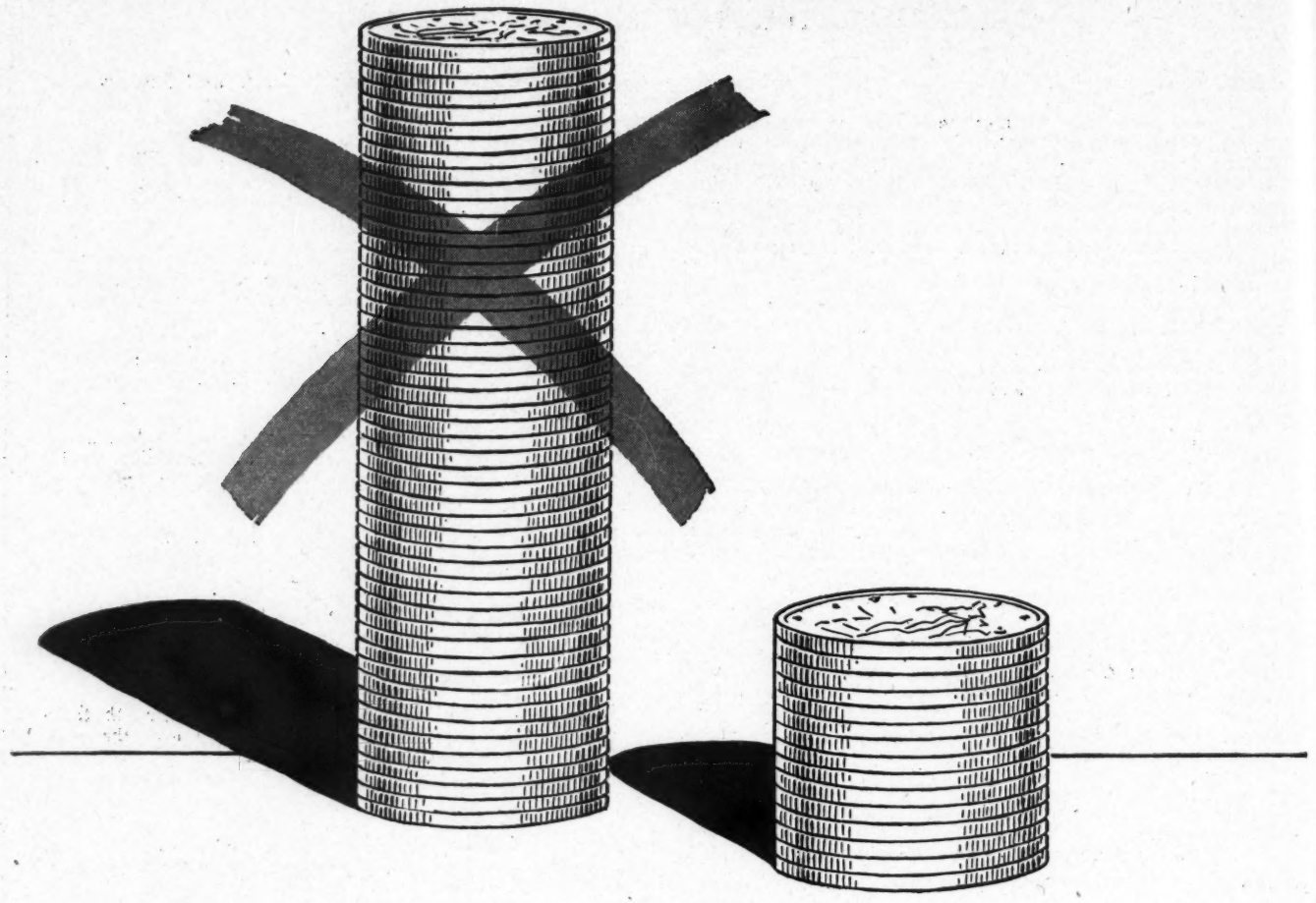
• *Muzak*—Wired music is brought over the telephone lines from the Muzak studios in Los Angeles. The wired music may be selected at any of the radio remote control stations throughout the house.

• *Television*—An RCA projection type television receiver is built in beside the fireplace.

• *Vent Control*—The bathroom vent is electrically operated by a shaded pole meter. A wall switch, labeled "open" and "closed" causes the motor to rotate one way or the other, opening or closing the vent.

• *Talkback System*—An inter-room communication system is provided between the master bedroom, kitchen, barbeque, front door, service door, and hobby shop. The master control stations are in the bedroom and kitchen and the system will not operate unless both of these are turned on. Station selection can be made only at the master control stations.

• *Lighting Control*—All lights are turned on by pressure on the plastic plates provided in each room, eliminating any hand operation. By multiple wiring all switches to a common master relay, all lights can be turned on or off from one point. This central control is located in the master bedroom.



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PROPER BALANCING

of the Forced Warm Air Heating System

By JOHN R. SCHEEL

Central Indiana Gas Co., Muncie, Indiana

IN the heating field, the utility has a duty to perform—that of giving its customers comfort in their homes during that part of the year when the outside temperature drops below 65°. The problems are many.

The present day trend of building leans to the basementless house. The choice of the market seems to slightly favor forced warm air heating. These two conditions lead to the possibility of cold and drafty floors in the homes of tomorrow.

When equipment is available, forced warm air heating is going to lose favor unless a better job is done. We have all the tools needed—good furnaces, controls, registers and grills. It is only for us to use these tools to the best advantage. Often these tools are used to good advantage on paper, but when it comes to the last thing that should be done on a job, the one simple thing that may mean the difference between a good job and a poor one—the proper balancing of the system—we fail miserably.

Importance of Balancing

It is common knowledge that a complete balance of a forced warm air system should be a part of each installation. At some time or other each of us has started out with good intentions, to properly balance each installation before the job is turned over to the customer.

This has been a long laborious job from which short cuts have been taken, eliminations made, and other methods devised. These resulting methods have been passed on to workers to use and the forced warm air systems have suffered. This suffering has been passed on to our customers in the form of drafty houses and hot and cold spot heating. Their lot has been aggravated by registers delivering blasts of air at temperatures from 65° up to and above 200°, and the resulting stratification of air. Most of these conditions can be charged directly to poor balance of the heating system.

In the design of a forced warm air system, every effort is made to have the system in perfect balance on paper. In this design, certain assumptions are made based upon past experiences. Conditions over which there is no control enter into the installation of every eating plant. Temperature and pressure drops in the ducts are different from those assumed in the design. It is because of these conditions that the design includes splitter and volume dampers. Occasionally the design, layout, and installation is perfect. The plant is in complete balance, when operating with all dampers in the wide-open position. Once in a while the forced air plant, as installed. is such an improvement over any plant the customer has had that it is ideal from his experience. More often the system is far out of balance, and it is necessary to make an attempt to balance it to satisfy the customer.

Thermometers may be placed in two or three of the rooms, the air delivery to these rooms being increased or decreased in an endeavor to equalize the temperature in the rooms. More than likely several such trys are made before the customer is satisfied. A proper balance of the job at the start will save much time and aggravation on the part of the customer, designer and installer.

Balancing methods vary from setting the plant to deliver the designed cfm from each register, setting each register to deliver air at some optional velocity, balancing to thermometers placed in each room, and even the "Visional Method"—visually measuring the angle at which the air being delivered will hold a handkerchief from the register with one side of the handkerchief attached to the register.

Each of these methods tells something, but not enough. The design cfm method would be ideal with the assurance of getting the design register temperature at each register, but this seldom, if ever, happens. The velocity method is a lazy guess at the cfm. The thermometer method is ideal as long as the plant operates under the conditions of operation when the balance was made. After a few hours of continuous operation, each room may have a perfect temperature balance; but with the plant back on intermittent operation more than likely the balance will not be there. The handkerchief method at least tells that air is being delivered from the register.

More Economical Heating

A customer is entitled to the best that can be offered, and if forced warm air heating is to continue in favor, uniform, comfortable, draft-free heating will have to be given. This can be done by completing every job with a perfect balance. A proper balance on an installation at the start will pay dividends in money saved and satisfaction. The money saved will not only be that saved in service calls, but also by giving the customer more economical heating. Even a poorly designed and laid out installation can be materially improved by an intelligent balance of the deliveries to each space.

How many times have we heard or been guilty of the statement "We will balance that job on a cold day"? When the cold day comes there are too many jobs scheduled, or more than likely other duties make it necessary to neglect the balancing. The advantage of the method herein presented is that the job can be done on any day. A preliminary balance can even be made on a hot summer day by making a few assumptions. With the data thus obtained, the job can be completed in a very short time at the start of the heating season.

The writer's company has experi-

THIS ARTICLE describes a method whereby a forced warm air heating installation can be properly and scientifically balanced at the time of installation practically without regard to the time of year or the temperature on the particular day. Such balancing, according to Mr. Scheel, will save money both in service calls for the utility and in economy of operation for the customer. In addition, balancing creates customer satisfaction by assuring operation with uniform and adequate heat with absence of drafts and intermittent blasts of hot or cold air. Too often, says the author, the balancing operation is left for a cold day or for when someone finds time to do it, and then the methods used are more the product of guesswork than of the scientific approach. The article gives in detail a specific application of the balancing method described as used on a five-room house.—Editor.

PROPER BALANCING

FORCED AIR BALANCE DATA

Name _____ Address _____ Town _____ Date _____ By _____

1 ROOM	2 HEAT LOSS	3 ROOM VOLUME	4 REG. TEMP	5 FACT	6 2x5 REQ	7 REG SIZE	8 REG AREA	9 VEL.	10 8x9 C.F.M.
L.R.So.	8500	1280	142 (148)	.0137 (.0128)	C.F.M. 116 (109)	10 x 6	SQ.FT. .26	350 (425)	91 (110)
L.R.No.	8500	1280	140 (145)	.0140 (.0132)	119 (112)	10 x 6	.26	500 (425)	130 (110)
	LIVING ROOM RETURN								220
D.R.	4200	940	134 (140)	.0151 (.0140)	63 (59)	8 x 4	.12	300 (500)	36 (60)
	DINING ROOM RETURN								60
KIT.	3800	880	132 (137)	.0154 (.0145)	59 (55)	8 x 4	.12	550 (450)	66 (54)
HALL	3500	470	140 (144)	.0140 (.0134)	49 (47)	8 x 6	.20	350 (250)	70 (50)
BATH	1900	340	130 (136)	.0159 (.0147)	30 (28)	8 x 4	.12	400 (250)	48 (30)
	KITCHEN, BATH & HALL RETURN								134
DEN	4600	540	134 (140)	.0151 (.0140)	69 (64)	8 x 4	.12	400 (525)	48 (63)
	DEN RETURN								63
B.R.	6600	1220	126 (134)	.0168 (.0151)	111 (100)	10 x 5	.21	350 (475)	73 (100)
	BED ROOM RETURN								100
TOTAL	41600	6950			616 (574)				562 (577)

Factors (Col. 5) for different register temperatures based on 65 degree return air temperature.

TEMP.	FACT.	TEMP.	FACT.
160	.0114	124	.0173
158	.0116	122	.0178
156	.0118	120	.0184
154	.0120	118	.0190
152	.0123	116	.0196
150	.0125	114	.0204
148	.0128	112	.0211
146	.0131	110	.0221
144	.0134	108	.0231
142	.0137	106	.0241
140	.0140	104	.0253
138	.0144	102	.0266
136	.0147	100	.0279
134	.0151	98	.0295
132	.0154	96	.0314
130	.0159	94	.0346
128	.0163	92	.0358
126	.0168	90	.0384

FURNACESTAT SETTINGS

Fan On_____Off_____

Limit On_____Off_____

A.C.(Air change) should be from 4 to 6 per hour for heating.

$$A.C.=\frac{\text{(Total Col.10) x 60}}{\text{(Total Col.3)}}$$

System is balanced when Col.10 equals Col. 6.

High Reg. Min.Vel. 500 ft./min.

Base board reg.Max.Vel. 300 ft./min., unless good defuser type register is used.

Minimize draft by balance of return air.

Figure 1.

enced no end of satisfaction in using the following balance procedure together with the attached form. This satisfaction has been twofold. Ideal economical heating for the customer, and after a few times working with this form the men get results. They can see what they are accomplishing; each and every room out of balance shows up very readily. An explanation of each step in the procedure plus a typical example follows:

The heating plant should be set at the required input. From a visual inspection of the pulley on the blower and the blower rating, an approximation of the amount of air it will deliver can be determined. This should be from 4 to 6 air changes per hour in the space to be heated. If the design data are available, the fan and limit switches can then be set to maintain the average assumed bonnet temperature. If these data are not available it will then be necessary, from the room by room heatless calculations, to determine the total heat loss of the building and the total volume of the heated space. From the total volume determine the cfm required to give the proper number of air changes using Equation 1.

$$\frac{\text{Volume in Cubic Feet}}{60}=\text{cfm} \qquad (1)$$

With the cfm thus obtained, together with the heat loss of the building, determine the average register temperature required to heat the building with this amount of air being delivered by Equation 2. and the table at the right of the form, Fig. 1.

$$\frac{\text{cfm}}{\text{Heat loss of building}}=\text{Factor} \qquad (2)$$

From the table on Fig. 1 find this factor just obtained and opposite it the average register temperature.

Next determine the average actual warm air run length, or take one-half the length of the longest run. Assume the temperature drop in the duct work, one-quarter to one-half degree per foot of duct, depending upon the conditions in the space in which the ducts are installed. From this get the average bonnet temperature by Equation 3.

Register temperature+Temp. drop/ft. x Ave. lgth.=bonnet temperature. (3)

With the required bonnet temperature known, set the fan switch slightly above this temperature, with the smallest possible differential between the on and off of the blower, without causing short cycling of the blower while the plant is in operation. Now set the limit control at a temperature just high enough above the fan switch setting so the limit control will cut in again before the blower cuts out. When this setting is proper, a uniform temperature will be maintained which will eliminate a great fluctuation of the register temperature, also cycling of the blower.

If the design data are available, columns 1, 2, 3, 7, and 8 on the form can be completed for each room. When these data are not available columns 1, 2, and 3 can be completed from the heatloss calculations for the building. The size of each register measured on the job will be entered in column 7. The register manufacturer's catalog will supply the net area required for column 8, or from our knowledge of registers these areas can be calculated.

With these data entered on the form, measure the temperature and velocity of the air at each register and enter this information in columns 4 and 9 respectively.

In column 5 enter the factor taken from the table in the form corresponding to each of the temperatures in

column 4. Multiply the heatloss of the corresponding space by the factor (that is column 4 by column 5) which will be the required amount of air to heat the space at the temperature it is being supplied, and should be entered in column 6. The actual cfm being delivered to the space is next determined by multiplying the net register area by the velocity (column 8 by column 9). Repeat this procedure for each space and check the cfm in column 6 against that of column 10. If they are the same the space in question is in perfect balance.

It is next to impossible to get both of these figures to agree perfectly; if they approach each other the space can be said to be in balance. If in each space these figures do not agree, it will be necessary to increase or decrease the bonnet temperature or amount of air being delivered to get agreement. Before any changes are made, check to determine if the total air changes of the space agrees with what is required.

In checking the air changes of the building, total column 6 which will give the total required cfm for the building, under the temperature operating conditions and column 10 will give the amount of air being delivered. With these totals and the total volume of the building (column 3) find the air changes per hour by Equation 4.

$$\text{Air Change} = \frac{\text{cfm} \times 60}{\text{Volume of space in cu. ft.}} \quad (4)$$

Using the total cfm from column 6 in Equation 4 will determine if the air change required under the operating temperature condition is correct. If the number of air changes is too high it will be necessary to increase the bonnet temperature; vice versa, with the number of air changes too low the temperature will have to be decreased. Likewise the amount of air being delivered will have to be increased or decreased depending upon what the calculated air change is when using the actual cfm total from column 10 in equation 4.

With the total required and actual cfm approximately equal and the number of air changes correct, each room may now be balanced by using the the dampers in the ducts. Increase or decrease the amount of air being delivered to bring it in agreement with the cfm required. With this accomplished the warm air side of the installation is in balance.

It will be wise to keep in mind the minimum velocity at the register should be 500 ft. per min. when high side wall registers are used, which as a rule will mean a rather low register temperature, possibly from 90 to 125°. Whereas with baseboard registers the maximum velocity should be 300 ft. per min. unless a good defuser type register is used, then higher velocities may be used. It will be found advisable to use high register temperatures with baseboard delivery, from 125 to 150°.

So many times a good warm air balance is wasted when no attempt is made to balance the cold air side of the system. Usually less care is taken in the design of the cold air side, and as a rule the cold air ducts are much oversized, especially where joist spaces are used. Because of this oversizing, care should be used in balancing the returns. With resistance low in some of the lines, a bad draft condition results as one or two of the returns are doing the complete return job. Minimize draft conditions by balancing each return to handle the amount of air delivered to the space the return was designed for.

Balancing Procedure

Repetition of this procedure in the form of an actual balance on a five room house may prove helpful. From the heatloss calculations, the heatloss and volume of each room are entered in the proper column of the form (Fig. 1.) There are two registers in the living room, so it is assumed each register will supply half the required heat for the room. The total heatloss is found to be 41,600 Btu's per hr. and the volume 6950 cu. ft.

Step by step procedure follows:

1. Assume five air changes per hour and use Equation (1)

$$\frac{6950 \times 5}{60} = 579 \text{ cfm}$$

2. Average register temperature required with this cfm from Equation (2) and Table;

$$\frac{579 \text{ cfm}}{41{,}600 \text{ Btu}} = .0139$$

From table, Factor .0139 represents a temperature of about 141°.

3. The longest warm air run is found to be 32 ft. The bonnet temperature from Equation (3) should then be:

$$141° + \tfrac{1}{2} \times \frac{32}{2} = 149°$$

Set the fan control at about 160°, with the smallest possible differential; be sure this setting does not cause the blower to cycle. The limit control is then set just above the setting of the fan switch, also with a small differential. With these settings check to be sure the plant begins to fire again before the bonnet temperature is low enough to cut out the blower.

5. Measure and enter the register sizes in column 7 of the form, and the net area of each in square feet in column 8.

6. Observe the temperature of the air leaving the register, also measure the velocity, enter these in columns 4 and 9.

7. Enter in column 5 the factor from the table corresponding to each of the temperatures in column 4. For example in the case of the south living room register in our problem; the temperature in column 4 is 142°. From the table the factor for 142° is .0137; this is entered in column 5.

8. Multiply the heatloss for each space (column 1.) by the factor for the space (column 5.) This gives the required cfm for the space with this register air temperature; enter this in column 6. In our problem the south living room we would have: 8500 (column 1.) x .0137 (column 5.) = 116 cfm (column 6.).

9. Determine the amount of air being delivered by multiplying the register area (column 8.) by the velocity (column 9.) Using the same space in our problem we have: .26 (column 8.) x 350 (column 9.) = 91 cfm (column 10.) Follow this procedure for each space, and complete all of the calculations including the totaling of columns 6 and 10. In our problem these totals are: Required cfm 616 (column 6.) and the Actual cfm 562 (column 10.)

10. Using Equation 4 to find the number of air changes in the case of both the required cfm (column 6.) and the actual cfm (column 10.) These become:

$$\text{Required } \frac{616 \text{ (total Col 6)} \times 60}{6950 \text{ (total Col. 3)}} = 5.3 \text{ air changes}$$

$$\text{Actual } \frac{562 \text{ (total Col. 10)} \times 60}{6950 \text{ (total Col. 3)}} = 4.8 \text{ air changes}$$

Either of these air changes might be satisfactory. In this case we will choose the smaller of the two, as this is a baseboard register installation and, although defuser type registers are being used, it is not advisable to increase the velocity of the air at the registers any more than is necessary, whereas an increase in register air temperature might be beneficial.

11. Set the fan and limit controls about 10° higher, which will increase the register air temperatures and in turn decrease the amount of air required.

12. Check column 6 against column 10 for each space, remembering that the figures in column 6 are going to be slightly reduced because of the increased register temperatures. If we have started with all the supply duct

dampers open, which we should have, it will be necessary to partially close the dampers in the ducts supplying the spaces in which the cfm in column 10 exceeds that of column 6. Referring to our problem and the tabulation of the required and actual cfms below,

Col. 1 *Room*	*Col.* 6 *Req. cfm.*	*Col.* 10 *Act. cfm.*	*Remarks*
L.R. So.	116	91	
L.R. No.	119	130	Partially close damper
D.R.	63	36	
KIT.	59	66	Partially close damper
HALL	49	70	Partially close damper
DEN	69	48	
BATH	30	48	Partially close damper
B.R.	111	73	

we will note after each space where it is necessary to reduce the supply to the spaces where the actual exceed the required.

By partially closing the dampers in the runs noted, the delivery to the other registers will be increased. Because of the great deficiency in the bedroom, it will be necessary to favor this run by slightly reducing the supply to each of the other spaces. The dampers set, we are now ready to recheck the delivery from each register and enter the information thus obtained in the form. These data for our problem are shown in parentheses in Fig. 1. With all the calculations complete, we find the warm air side of the system in balance.

In balancing the returns, if there is a return from each space heated, adjust each return to carry the amount of air supplied the space. In most cases we will not find returns in each space, as happens to be the case in our problem. In this case each return should be balanced to return the air supplied the spaces the return was designed for, or balance to return the air to produce the minimum of draft.

The returns in our problem have been entered on the balance data form (Fig. 1) together with a notation as to the rooms the return is to take care of. Each return is then balanced to take the proper amount of air, that is:

Living Room Return	220 cfm
Dining Room Return	60 "
Kit. Hall, Bathroom Return	134 "
Den Return	63 "
Bedroom Return	100 "

With this completed, we have followed our job through to completion and given our customer a satisfactory forced warm air heating installation.

Kansas University Offers Complete Home Study Course in Natural Gas Operations

WITH numerous servicemen returning to positions formerly held in the gas industry, and the employment of new personnel, the home study course offered by the University of Kansas at Lawrence is particularly significant. The course is primarily for persons engaged in the industry who wish to extend their knowledge while still actively employed. It is especially helpful to younger men with limited experience, but it covers the fundamentals of the various phases of the industry to such an extent that it has proved valuable to executives. The subject matter covers the entire field of natural gas operations, from origin to utilization.

This course was proposed by the American Gas Association about 15 years ago, and the University of Kansas was asked to prepare a text and to conduct a course through its extension division. The text was published in 1934 and the course has been in continuous operation since that time under the personal supervision of Professor C. M. Young. The material of the text was reviewed and criticized by an advisory committee of the A.G.A., and supplements are prepared from time to time to keep it up to date. These supplements are sent to all students who have completed the work as well as those currently engaged in it.

The course consists of 27 assignments, followed by questions to be answered by the students. Students are permitted to submit lesson reports as rapidly as they wish, and each is encouraged to continue the work regularly and systematically. Experience has shown that the course may be completed in as short a period as five months, but the large majority of students require a period extending over the greater part of two years. This necessarily depends on the previous preparation of the student and the amount of time he is able to devote to study.

The cost of the course to individual members and to employees of member companies of the American Gas Association, as well as to all residents of the state of Kansas is $54. For all others, the fee is $72, payable in advance; or $74.50 on a time payment plan.

Enrollments are accepted at any time. Application blanks and any further information desired will be gladly furnished by either the University Extension Division, University of Kansas, Lawrence, Kan., or Kurwin R. Boyes, Secretary, American Gas Association, 420 Lexington Ave., New York 17, N.Y.

1946 Outlook Bright For Gas Industry

The gas industry has entered the most promising era of its 126 year existence, H. Carl Wolf, managing director of the American Gas Association, told industry members recently. Four years of war created a backlog of approximately 4 million gas ranges, neded to meet normal demands. Gas refrigeration requirements are estimated at more than 2 million units today. Gas water heaters and gas air-conditioning units practically have been out of production during the war and now are in big demand.

The keenest competition in the next few years doubtless will be met in the field of domestic cooking. Competitive fuel industries have published impressive figures of gains made in this field. The gas industry's record here also is noteworthy, since approximately 20 million of the nation's 35 million families used gas for cooking at the end of 1945. This means where gas is available, either on city mains or by delivered tanks or cylinders, about two out of three families use it.

In the past 10 years, annual sales of gas ranges have averaged 150% of the number of ranges sold in 1935. In the five years before the war, when competition in the cooking field was heaviest, sales of gas ranges were from 106% to 169% (2,277,000 gas ranges) of sales in 1937, which was one of the best pre-war years.

Normal production of gas ranges is estimated at 3,100,000 units a year for the next three years. Estimates of new homes vary from 820,000 to 1,300,000 units a year for the next 10 years. These homes are potential markets to become all-gas homes. Wolf said that the gas industry is prepared to meet all competition and to retain its position of leadership as the ideal fuel for the home.

South Atlantic Gas Co. Acquires Florida System

H. Hansell Hillyer, president of South Atlantic Gas Co., Feb. 6 announced final acquisition of the million dollar Central Florida gas system of the Florida Power Corp. Headquarters of the entire $5 million organization will be at Orlando, Fla. The company will operate four gas plants to meet the service needs of approximately 30,000 customers in six cities. About 10,000 of the customers are located within the Orlando-Winter Park area. Maj. Howard S. Wheeler, vice president of Leedy-Wheeler & Co., and F. Burton Smith, general manager and secretary-treasurer of the Florida Utilities Corp., are directors of the organization and Buell Duncan is vice president in charge of Florida operations.

"MARK-SENSING" TABULATING CARDS

For Handling Partial or "Split Cash" Payments

THE use of punched cards for public utility consumer's billing and accounts receivable operations offers, as one of its particular advantages, a continuous control of the accounts receivable file as it is affected by the daily posting of cash through the removal of "paid" cards. Because each day's paid cards can be machine-tabulated or listed to verify their agreement with the originally reported total of cash to be posted, the remaining accounts receivable cards are continuously guarded against human errors which might occur in the daily posting operation.

One of the factors which enters prominently into the cash posting and cash reconciliation operation, is the handling of less than full amount payments or, as they are termed, "cash splits." As the term implies, where such a partial payment is received, it becomes necessary to "split" the original accounts receivable card by replacing it with two new cards—one for inclusion with the "paid" cards to equal the amount of payment, and one for return to the accounts receivable file for the unpaid balance. While some public utilities have adopted the practice of handling such partial payments as daily manual memorandum entries made to the original cards which are replaced by new net amount cards prior to subsequent billing, the Consolidated Edison Company of New York, Inc., has adhered to the conviction in its tabulating card consumers' billing operation that this method is less satisfactory in that it sacrifices the unique benefit which tabulating card operation offers of the daily control of accounts receivable file through the listing of all paid cards.

In order to handle partial payments, the practice was followed for many years of manually key-punching the two new cards required. During the past two years, however, the Consolidated Edison Co. has used in its Brooklyn Edison District an adaptation of mark-sensing tabulating cards for this operation with satisfactory results in terms of much speedier processing of partial payments, reduction in labor required, and almost total elimination of human error in the machine-processes involved.

The principle of mark-sensing is the pencil marking of horizontal lines in predetermined positions on tabulating-cards so that presence of the carbon deposited from the pencil will complete an electrical circuit when the card is passed through a reproducing gang-punch equipped with brushes placed so as to coincide with the predetermined pencil marking fields. The completion of the electric circuit actuates the reproducing gang-punch to punch into the tabulating card the numbers corresponding to the number positions originally pencil-marked with horizontal lines.

When a partial payment is to be posted to the accounts receivable file, the accounts receivable card for the proper account is withdrawn and a memorandum apportionment is made of the amount paid and the balance due, the total of which must agree with the amount of the original card as shown in Fig. 1. The next step consists of the pencil-marking of two mark-sensing tabulating cards—one with pencil marks drawn through the numbers corresponding to the amount of partial payment and the other with pencil marks drawn through the numbers corresponding to the amount of balance due. (See Figs. 2 and 3). The original accounts receivable tabulating card with the two pencil-marked tabulating cards immediately behind it are then passed through an International Business Machines Corp.'s reproducing gang-punch equipped with the mark-sensing feature.

The machine operates so as to be actuated by the passage of an electric current through the carbon deposited on the tabulating cards at the positions previously pencil-marked, and

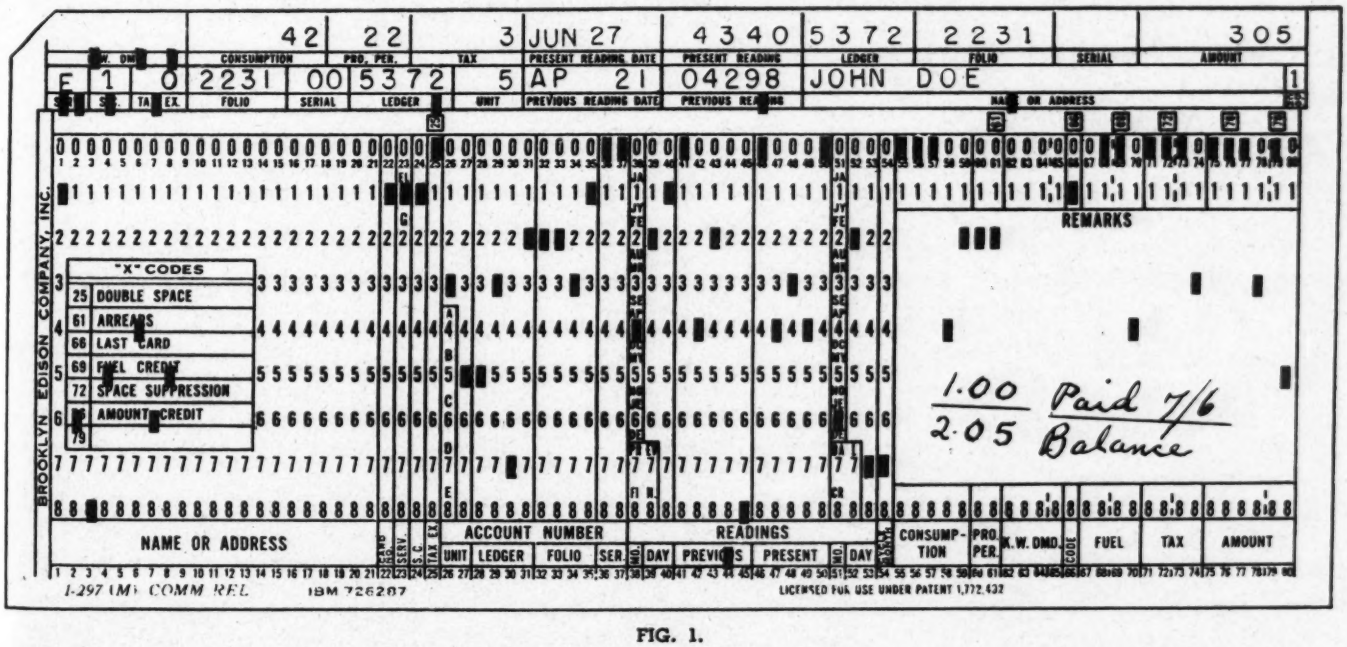

FIG. 1.

TABULATING CARDS

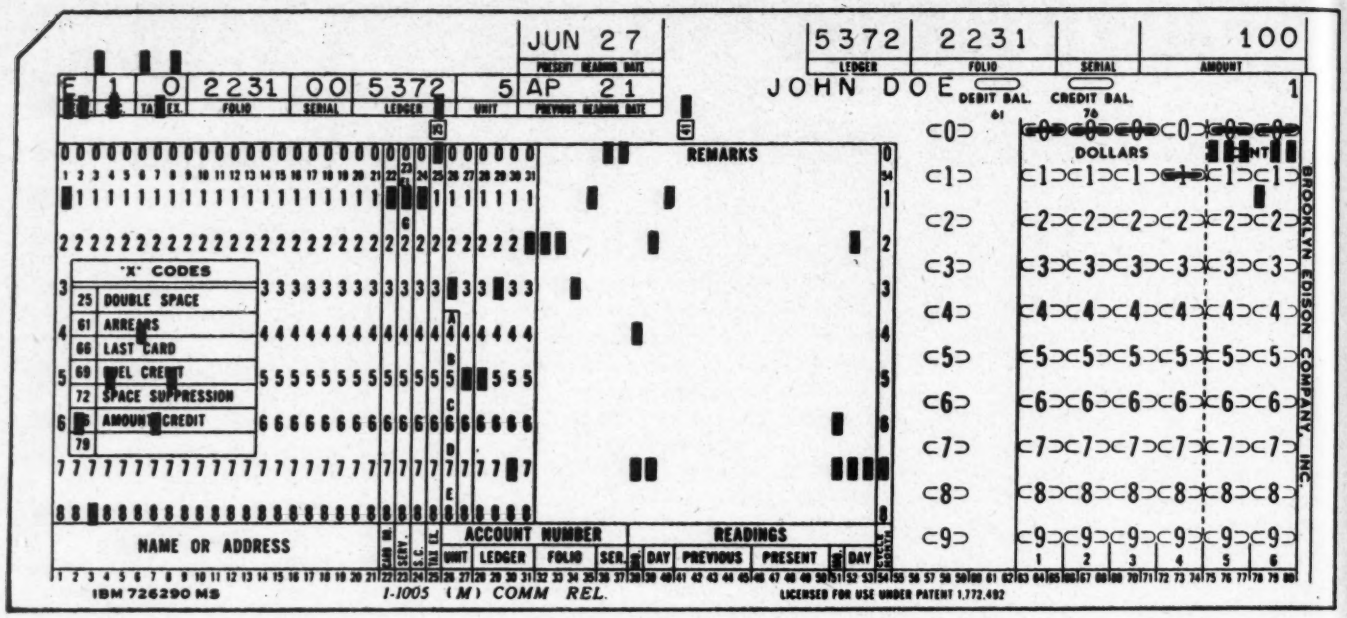

FIG. 2.

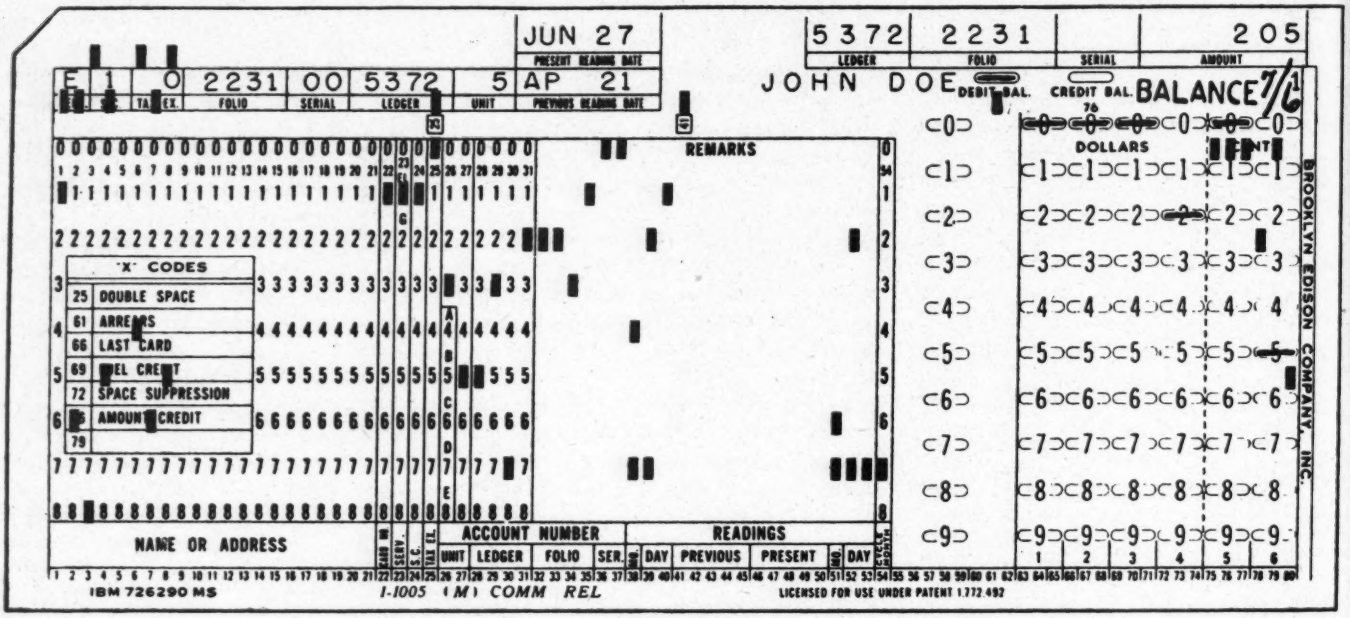

FIG. 3.

punches the corresponding numbers to the designated "Amount" columns of the cards. During the same operation, all other desired data are reproduced from the original accounts receivable tabulating card to the two new mark-sensing cards. The latter are then interpreted by machine to show the desired information along the upper edges as illustrated, and the processing operation is completed. While the above sequence of stops is described for one transaction, in actual operation an entire day's transactions are processed in a batch and several hundred transactions per day consume only a matter of minutes of machine processing after the pencil marking has been completed.

After the machine-processing, and as a precautionary measure only, the completed batch of machine-processed cards are machine-listed on a tabulator to assure the agreement of the total of original cards with the totals of new cards. This operation not only proves the correctness of the batch, but also discloses any error in any individual transaction, thus guarding even against the remote possibility of a contra-error.

After the tabulator proof listing, which requires even less time than the reproducing gang-punch operation, the original accounts receivable cards are machine-sorted out from the batch and are held for possible later reference and then destroyed; the two new cards are concurrently machine-sorted into their appropriate groupings. The partial payment cards are included in their proper position with the day's paid cards and the cards for the balances due are returned to their proper positions in the accounts receivable file.

This process has been found very satisfactory from a machine-processing standpoint, permits of retaining the integrity of the daily cash posting control, eliminates a former "bug" which arose when a large number of partial payments was included in a heavy day's receipts and offers an interesting example of the possibilities of "mark-sensing" as applied to electric tabulating card operations.

GAS MEN

in the Spotlight

Officers of INGAA (left to right) F. W. Peters, of Tulsa, Okla., treasurer; E. Buddrus of Chicago, Ill., president; and J. H. Dunn of Amarillo, Tex., second vice president.

Joe B. Burge, of the Iowa Public Service Co., is shown at left above receiving his 50-year service button from H. M. Smith, assistant general manager.

Executives of Clark Bros. Co., Inc., discuss the compressor industry with R. R. Bloss, president and general manager of International Derrick & Equipment Co. Left to right: Mr. Bloss; W. A. Roever, Houston sales engineer; F. H. Hayes, Houston district manager; D. K. Hutchcraft, sales manager; J. N. MacKendrick, chief engineer.

Board of Directors of the A.G.A.

Board of Directors of the American Gas Association (seated left to right) Maj. T. J. Strick'er, vice president; Chas. M. Cohn, chairman of the board; Kurwin R. Boyes, secretary; R. H. Hargrove, vice president; Gladys Hanshaw, Everette J. Boothby, president; Colonel Hudson W. Reed, vice president. (standing left to right) Randall J. LeBouef, Jr., Counsel; H. Leigh Whitelaw, managing director, G.A.M.A.; Lyle C. Harvey, president, G.A.M.A.; R. M. Conner, director, A.G.A. Testing Laboratories; Edward P. Noppel, chairman, A.G.A. Co-ordinating Committee on Research; Henry H Morse; Henry Fink; Earl H. Eacker; Dorr P. Hartson, chairman, National Advertising Committee, A.G.A.; C. S. Goldsmith; Norton McKean; Alvan H. Stack; John J. Quinn, chairman, Residential Gas Section; Joseph N. Greene, chairman, Membership Committee; Frank H. Adams, chairman, Mfrs. Section; George E. Whitwell, chairman, Laboratories Managing Committee; H. Carl Wolf, managing director.

Meet the Cooper-Bessemer GMX

THE GMX 2-cycle, V-engine-driven compressor is the companion unit to Cooper-Bessemer's larger, well-known GMV. Thus the GMX and the GMV differ mainly in size. In fact they share all the outstanding features that contribute to the exceptional GMV performance in all kinds of gas transmission, repressuring, refining, processing, and synthesis service. Here are only a few of the advantages they offer in common:

1. Tough Meehanite Metal Construction
2. Silent Scot Fuel Injection
3. Low Pressure Streamlined Scavenging
4. Symmetrical Pistons and Heads
5. Outside Water Jumpers
6. Turbuflow Oil Cooled Pistons
7. Tin Plated Pistons
8. Saddle-Type Piston Pin Construction
9. Precision Type Interchangeable Bearings
10. Articulated Connecting Rods
11. Counterweighted Crankshaft
12. Full Pressure Lubrication
13. Dual Lube Oil Filtering
14. Automatic Speed and Capacity Control

The nearest Cooper-Bessemer office will be glad to give you detailed information on any or all of these features and on the advantages they afford.

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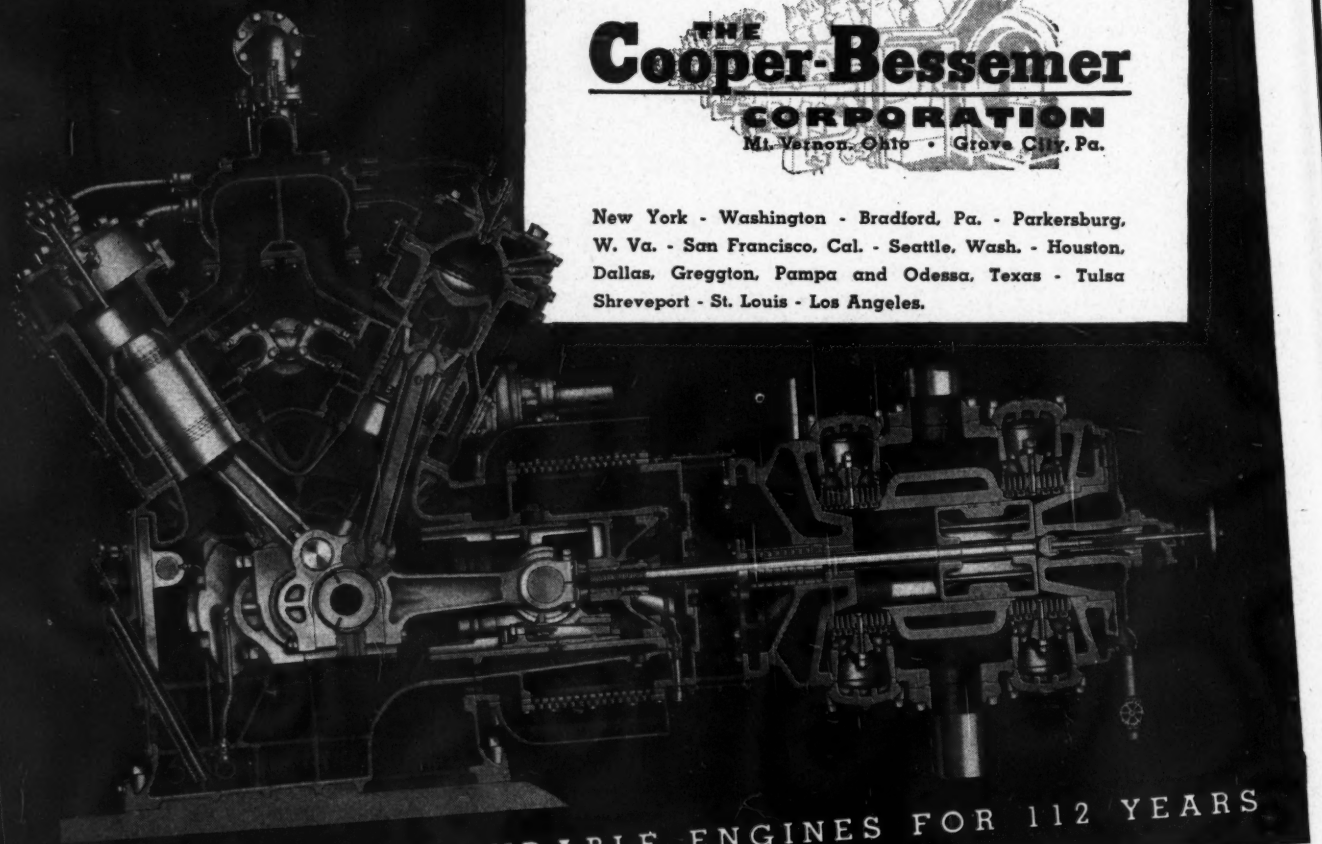


BUILDERS OF DEPENDABLE ENGINES FOR 112 YEARS

By CHARLES F. BRISCOE

Construction Engineer,
Southern Counties Gas Company

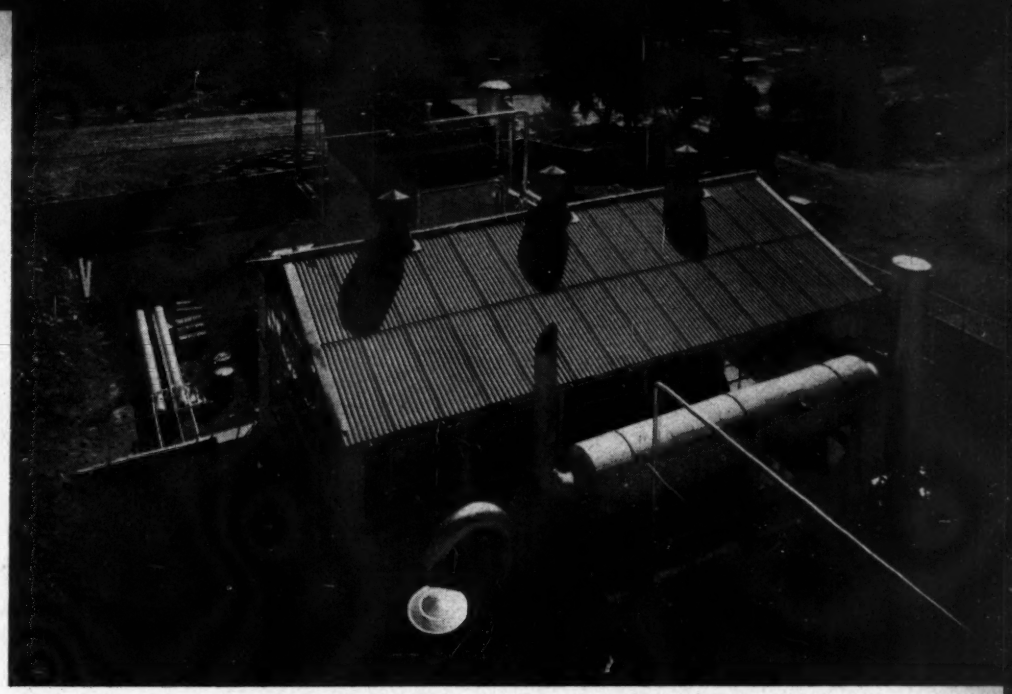


Fig. 1. General view of the Dana Point Compressor Station of Southern Counties Gas Co. placed in operation in December, 1945. Maxim silencer (foreground) insures quiet operation. Fin-Fan cooler is shown in background.

Southern Counties Gas Company Builds Two New COMPRESSOR STATIONS

To Boost Supply to San Diego and to Conserve Surplus Gas

THE closing of the year 1945 saw two new natural gas booster stations, namely Dana Point and Jalama, go into operation on the Southern Counties Gas Co.'s system. These two stations each have one main compressor unit, with auxiliaries, and while they are in general similar to other multi-cylinder angle type installations, they embody features in which the reader might be interested.

C. F. Briscoe

THIS ARTICLE, which has been prepared exclusively for GAS, describes generally the design and construction of two compressor plants placed in service by Southern Counties Gas Company in December, 1945. The installation at Dana Point is of particular interest both because it is the largest gas compressor on the Pacific Coast and because it will shortly be converted for operation on the gas-diesel cycle, being, so far as is known, the first engine of this type in the country. Mr. Briscoe has been construction engineer for Southern Counties since 1941, prior to that time being associated with other gas utilities in Southern California dating back to 1926. A graduate of the University of California at Los Angeles, he holds the Gold Medal Award of the Pacific Coast Gas Association for work in gas dehydration.—Editor.

The Dana Point compressor plant is located on the 80-mile long, Huntington Beach-San Diego 12-in. pipe line at Dana Point on Highway 101, a few miles south of Laguna at the mouth of San Juan Creek. This station was installed for the purpose of increasing the pipe line delivery capacity to San Diego from 25 MMcf per day to about 37 MMcf daily. The plant was designed to handle this volume of gas with an intake pressure of approximately 250 psig. and a discharge pressure of 400 psig.

A Cooper-Bessemer type GMV, ten-cylinder, two cycle gas engine, having a rating of 1000 BHP and equipped with four compressor cylinders was selected for the job. The engine, however, will presently be converted for operation on the gas-diesel cycle and will be the first engine of this type on the Pacific Coast. Much interest has therefore been shown in this installation by men involved in compressor applications.

Jacket water cooling, oil cooling and gas after-cooling are all taken care of by one large Fin-Fan radiator unit. This arrangement has resulted in a very neat appearing and compact plant, and thus maintenance of buildings and equipment is expected to be kept to a minimum, due to the elimination of the effect of cooling tower drift on painted surfaces. The radiator fan engine was generously sized to permit a wide range of operations independent of the atmospheric temperature.

A jacket water temperature rise of not to exceed 10° F was contemplated in the design, and an automatic temperature controlled cooling coil bypass provided to maintain the jacket water temperature at any desired setting. The lubricating oil is maintained at approximately 5° F to 10° F below the jacket water temperature. The jacket water pump is mounted on the main unit and driven by a Vee-flat drive from the flywheel. The auxiliaries required are the fan drive engine and the starting air compressor, which is a small air-cooled gas engine driven setup.

Other equipment includes a 40 MMcf daily capacity gas scrubber on the plant intake, automatic piston operated plug valves, and a Maxim engine exhaust silencer. The latter has resulted in an extremely quiet operating engine, an important consideration due to the adjacent residental area. The silencer and all hot exhaust piping was sprayed with aluminum by the metallizing process. Experience of several years has proven the value of this treatment at the com-

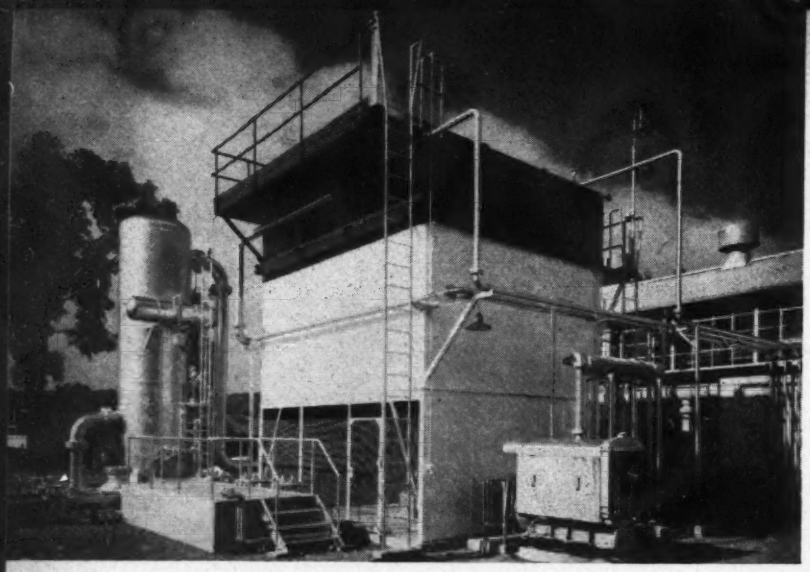
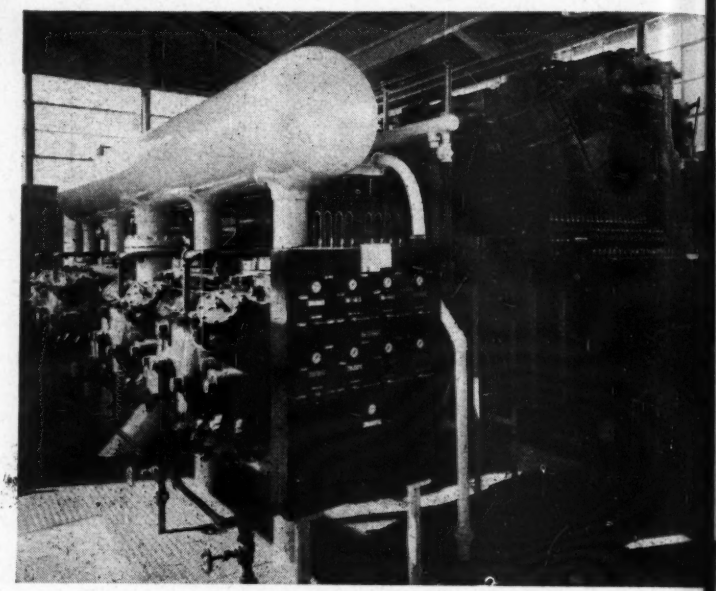


Fig. 2. (Left) Fin-fan radiator unit (center) takes care of jacket water cooling, oil cooling, and gas after cooling. Scrubber is shown at left. Climax engine (right) drives cooling unit fan.

Fig. 3. (Below) Cooper-Bessemer type GMV, 10-cylinder, two cycle gas engine with rating of 1000 BHP. The engine will be converted this spring for operation on the gas-diesel cycle. Control panel in foreground handles automatic operation of compressor cylinders.



pany's Ventura plant where it is no longer necessary to paint unsightly exhaust mufflers and piping due to paint having burned, peeled or rusted through. Clean and dirty lubricating and scrubber oil storage vessels are included in the design.

Since it was anticipated that the operating pressures and volume demand would vary over a wide range, all compressor cylinders were fitted with automatic unloaders. With this equipment it is possible for the demand to vary from zero to maximum and the unit will automatically adjust its displacement to handle the required volume. For example, in the event the demand goes to zero, the unit completely unloads and idles at half speed until such time as the demand tends to lower the discharge pressure. When this occurs, the engine comes up full speed and the controls put into operation the number of compressor cylinders needed to maintain a steady, maximum discharge pressure of 400 psig.

In order to eliminate the necessity of continually repainting the floor, it was stained by an acid process to a russet brown leather color. It is expected over a period of time, considering normal damage to the floor surface by tools and oil impregnation, that less effort will be necessary to maintain a neat appearance than if the floor were painted or finished in natural concrete color.

The rigid frame steel building carries a small traveling crane for maintenance and repair work and the building exterior is covered with Transite. Corrugated sheets were placed on the roof, and flat sheets on the side walls. Since it was desired to have the booster station buildings conform in appearance to the existing structures, the flat Transite worked into the plans very well, as it is an acceptable fireproof material and can be easily painted to match existing buildings.

A very interesting problem encountered was one resulting from ground water appearing in the main engine foundation excavation. The exposed formations in the area surrounding the plant site consist of conglomerate, sandstone and shale, all rather loosely consolidated but quite stable. Upon reaching a depth of about 5 ft. in the main engine foundation excavation, a 12-in. blue sand stratum was encountered and a full scale spring developed. There was evidently very little hydrostatic head in the stratum as the water would rise to a depth of about 1 ft. in the excavation and remain at that elevation.

In order to correct this difficulty, a trench was dug around two sides of the excavation to a sufficient depth to intercept the water bearing stratum, the bottom of the trench being carried to a point about 12-in. below the bottom of the sandy stratum. The bottom of the trench was then brought to an even grade and plain end tile installed with ½-in. end spacing and the top half covered with a strip of asphalt felt. After a rock fill consisting of coarse and fine rock was placed to give a cover of approximately 1 ft., the balance of the trench was filled with original material.

Upon completion of the drain tile, the flow of water was checked at something in excess of 2 gpm and the engine block foundation excavation remained entirely free of water.

A clean-out connection was provided at the upstream end of the drain tile so that any accumulated sand could be flushed from the tile; however, as far as can be determined, there has been no infiltration of sand in sufficient quantity to impair the operation of the drain.

Personnel involved in the construction work included Robert Ott, superintendent, Southern Counties Gas Co., San Diego Pipe Line District; Frank Pargee, inspector; M. A. Nishkian, chief engineer, Oil Field Construction Co., the contracting firm; and Julius Hermann, superintendent for the contractor.

Jalama Station

The location of the Jalama compressor plant is in Santa Barbara County on Jalama Road about one and one-half miles westerly from the highway between Lompoc and Las Cruces. The plant name stems from the fact that the station is on a parcel of land which was originally a por-

tion of Rancho Jalama, one of the early large Spanish land grants in that area.

The function of this station is to increase the volume of gas transmitted from the Santa Maria oil fields to the La Goleta natural gas field for storage at the latter point, thereby conserving surplus gas from the Santa Maria area. The length of the Santa Maria—La Goleta line is about 63 miles and the diameter is nominal 8-in. This installation raises the capacity of the line from 7.4 MMcf per day to approximately 12.6 MMcf daily with a plant intake pressure of 240 psig. and a discharge pressure of 405 psig.

The main compressor unit is a Clark angle type RA-4, four cylinder, two cycle natural gas engine with a rating of 400 BHP equipped with three compressor cylinders. This engine is equipped with a speed control and is set up to maintain a discharge pressure of not to exceed 405 psig. With a variation of from full speed to half speed, the unit can automatically handle wide variations in pipe line flow. It is interesting to note that while the Dana Point Station is controlled by demand, the Jalama Station volume handled is determined by the supply.

Jacket water, oil and gas after-cooling is accomplished by an atmospheric type cooling tower which is mounted in a large steel tank to provide water storage space. This was made necessary because of the water supply situation, the source being from a well which was drilled near the plant. Sufficient storage volume is provided to permit uninterrupted operation in event of temporary power failure or in case repairs to the well pump are necessary.

An atmospheric type cooling tower was selected because the high atmospheric temperatures during the summer months would not permit the desired degree of gas after-cooling by the use of a radiator system such as that chosen for the Dana Point Station. Provision is made for automatic jacket water temperature control by the use of a cooling coil by-pass. The jacket and tower water circulation is handled by two Union centrifugal pumps arranged in tandem on a single base and driven by a Vee-belt drive from the engine flywheel. This setup eliminates the necessity of auxiliary engines other than the small gas engine driven air compressor which furnishes air for starting.

Other equipment consists of a 15 MMcf daily capacity intake gas scrubber together with necessary storage facilities for clean and dirty lubricating and scrubber oil. The floor finish consists of a brick colored topping to eliminate painting and improve the general appearance. The same type of rigid frame building as designed for Dana Point was erected at this plant except that corrugated galvanized iron was used for covering rather than Transite.

It seems that there are very few jobs which do not have their problems and whereas the trouble at Dana Point was too much water, the problem at Jalama was too little water. The reaction was amusing when a well-known water well driller was contacted regarding the matter of drilling a water well for the plant supply. He stated while he had no confidence in water witching in general, that he would be afraid to drill a well without it. However, after some considerable discussion accompanied by the repeated "twisting" of willow twigs and "bobbing" of bailing wire indicators, a location was chosen, the well drilled and a water source satisfactory for the requirements was established in time to meet the other schedules.

The work of constructing Jalama Station was followed to completion by R. B. Bruce, superintendent, Southern Counties Gas Co., Northern District; R. J. Klaasen, inspector; Walter Kaucher, engineer for H. B. Nicholson Co., the contracting firm; and H. T. McNiel, superintendent for the contractor.

Engineers having experience in compressor plant construction will appreciate the fact that no serious problems of vibration were encountered when these two plants were put into operation. The plant layouts were handled by G. T. Martin of the Mel-Mar Co.

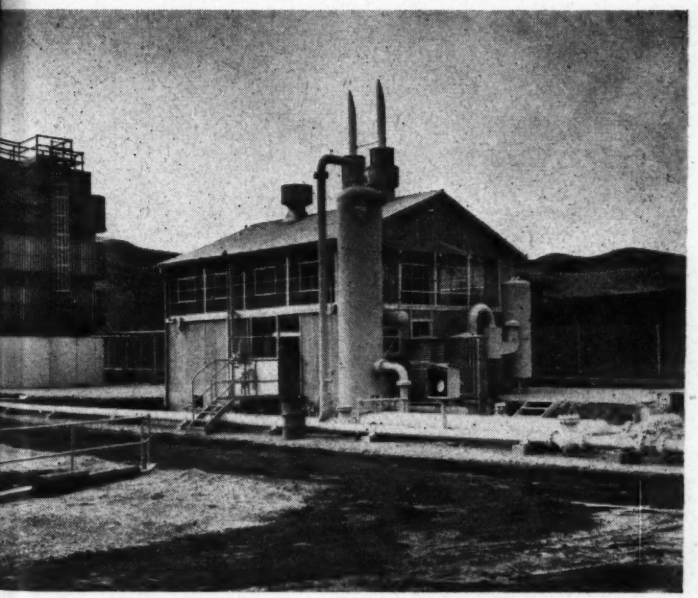


Fig. 4 (Above) Overall view of Jalama station showing (left to right) the cooling tower, compressor building, gas scrubber, and valve manifold.

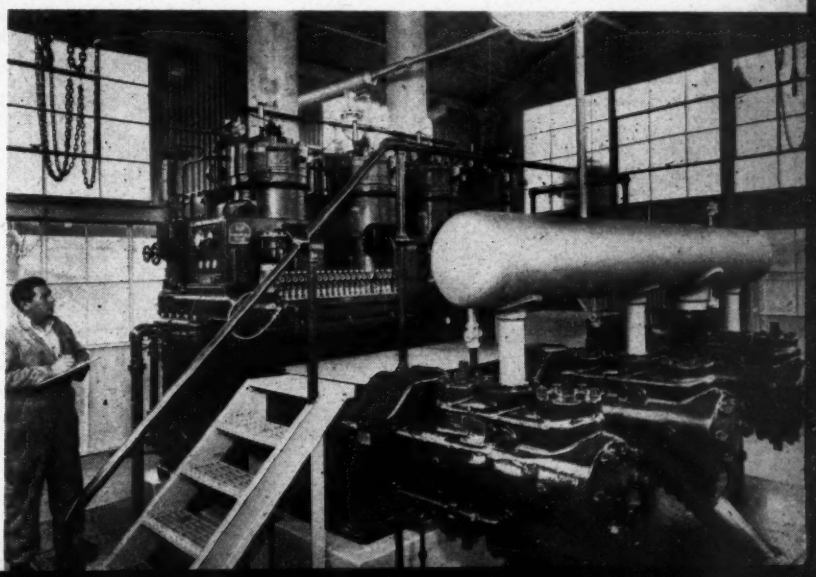
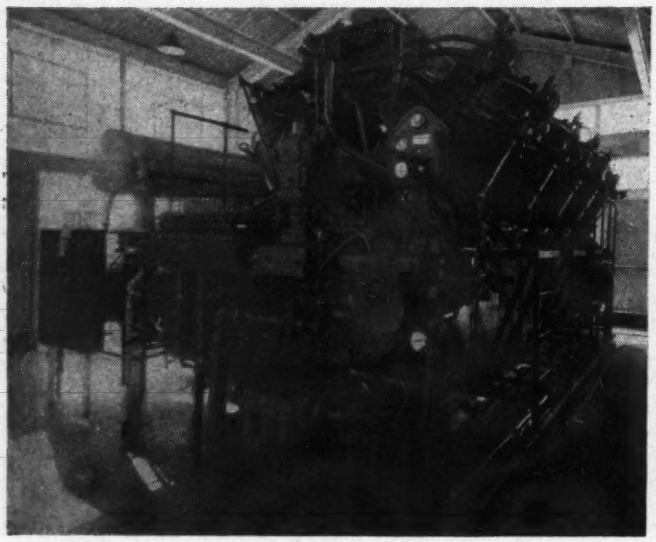
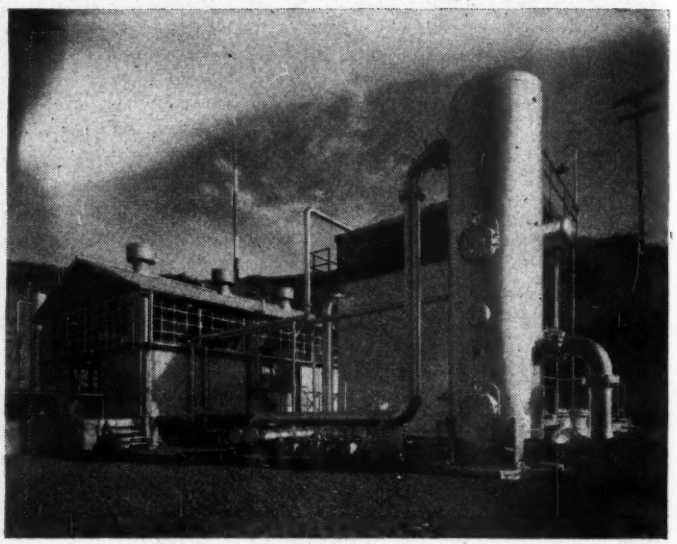


Fig. 5. (Right) R. J. Klaasen, plant operator, watches the automatic speed control on the 400-hp Clark compressor unit at the Jalama station.

ANOTHER OFCCO JOB





Dana Point Booster Station

Another compressor station completed in 90 day record time by OFCCO Construction Company. 25 years experience in this specialized type of plant construction makes such records possible. Complete engineering, fabrication and construction facilities are available at OFCCO for any of the following work:

- COMPRESSOR PLANTS
- ABSORPTION PLANTS
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- GENERAL PIPING
- MASONRY & CONCRETE
- PLANT REPAIR & MAINTENANCE

Oil Field Construction CO. becomes OFCCO

The Long Beach branch of the Oil Field Construction Company becomes the OFCCO Construction Co., Inc., as of January 1, 1946. Management and Personnel will remain the same. Complete engineering and construction service will be available for the following industries: Gas-Petroleum-Chemical — and affiliated industries. The Bakersfield branch will continue to operate under the same management as Oil Field Construction Company.

CONSTRUCTION OFCCO COMPANY, INC.

ENGINEERS -- DESIGNERS -- CONSTRUCTORS

OFCCO CONSTRUCTION COMPANY, INC.

2650 CHERRY STREET LONG BEACH, CALIFORNIA

The INFLUENCE of NATURAL CONVECTION on the Effectiveness of Radiant Heating

Its Bearing on the Choice of Heating Systems

BY J. B. CARNE, B.Sc.
South Metropolitan Gas Company, London, England

THE NECESSITY for considering the convection loss from heated objects during "infra-red" processing is pointed out in this paper by Mr. Carne, first published in "Gas Times", September 29, 1945. The dependence of the magnitude of this loss on the curvature of the object surface and its relatively greater magnitude for sharply curved objects are discussed. The results of an experimental investigation of the effect are detailed and shown to confirm deductions from published heat transfer data. Paint processing observations supporting the temperature data obtained are also given. It is concluded that high temperature air is essential to the economic heating of sharply curved objects and to the attainment of uniform temperatures where objects of various curvatures or differing absorbing properties for the radiation employed are heated simultaneously in the same oven. Suggestions as to the form of test objects used in measuring the performance of radiant ("infra-red") ovens are made.

ALTHOUGH in recent literature dealing with "infra-red" heating reference is to be found to the advantage in certain circumstances of convective heating over "infra-red" heating, no physical criterion or precise information for estimating the suitability of either system or of a combination of them for a particular heat treatment is to be found. Physical considerations in the case of "infra-red" heating show that the magnitude of the convection loss from the heated object relative to that of the radiation absorbed by it is all important.

Fundamental to this relation is the dependence of the convective loss from an object on its curvature, a factor in "infra-red" heating technique which appears to have received little, if any, attention. Its importance became strikingly manifest in the extreme difficulty experienced in drying paint on thin rods when these were surrounded by unheated air and irradiated by electric "infra-red" lamps, although the same painted rods dried rapidly when exposed to "infra-red" radiation in a gas-fired radiant heat cabinet.

The explanation advanced, that the high rate of convection from the thin rods was accentuated in the case of the relatively cool air of the electric system and resulted in an equilibrium temperature of the rod below the processing temperature of the paint, is supported by the fact that the same paint on flat plates dried rapidly in both electric and gas "infra-red" ovens.

Equilibrium Temperature

In most heating processes it is not only desirable but also essential to raise the temperature of the object of treatment above a certain minimum temperature in order to bring about desired physical or chemical changes. Advantageous use of "infra-red" heating is due chiefly to the rapid attainment of the specified temperature which such systems can effect. The emphasis which has been laid on the absorption of radiation has somewhat obscured the role of convective loss, although it is equally important in determining the maximum temperature attainable by the object under treatment. The paramount importance of the capacity of an oven to raise the object under treatment to an adequate temperature is evident from the fact that, while the rate of temperature rise effected merely controls the rate of through-put of the oven, failure to raise the object to the minimum processing temperature renders the heating system wholly unsuitable for its purpose.

Since, therefore, the attainable temperature is a prime characteristic of an oven, attention here is given mainly to the physical factors on which this depends.

Calculation of Equilibrium Temperature from Heat Transfer Data

Exchange of heat between the object of treatment and its surroundings takes place almost entirely by radiation and convection according to well established laws. Equilibrium thermal conditions result when the gain of heat by the object by absorption of radiation is balanced by the loss from it due to convection. The quantities can

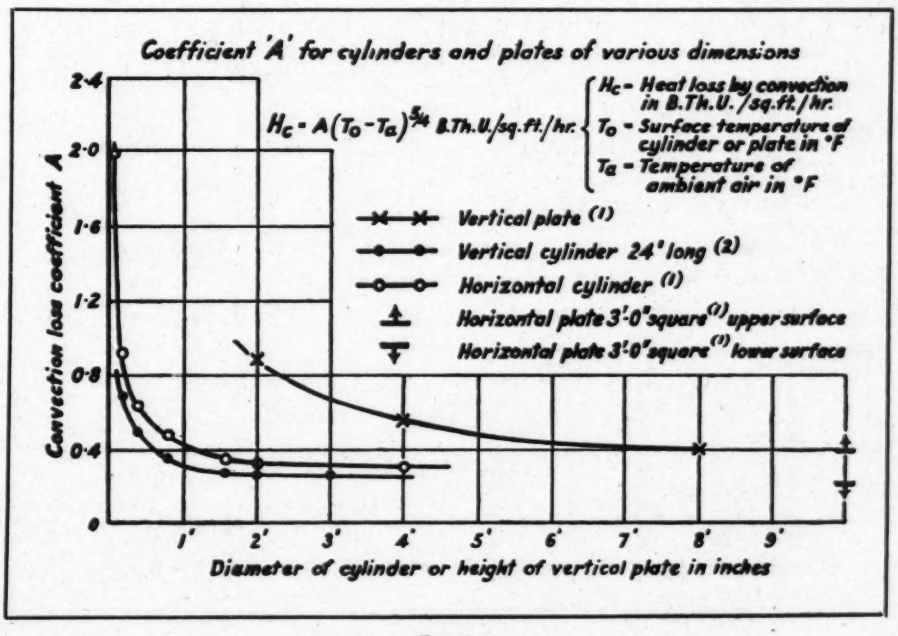

Fig. 1

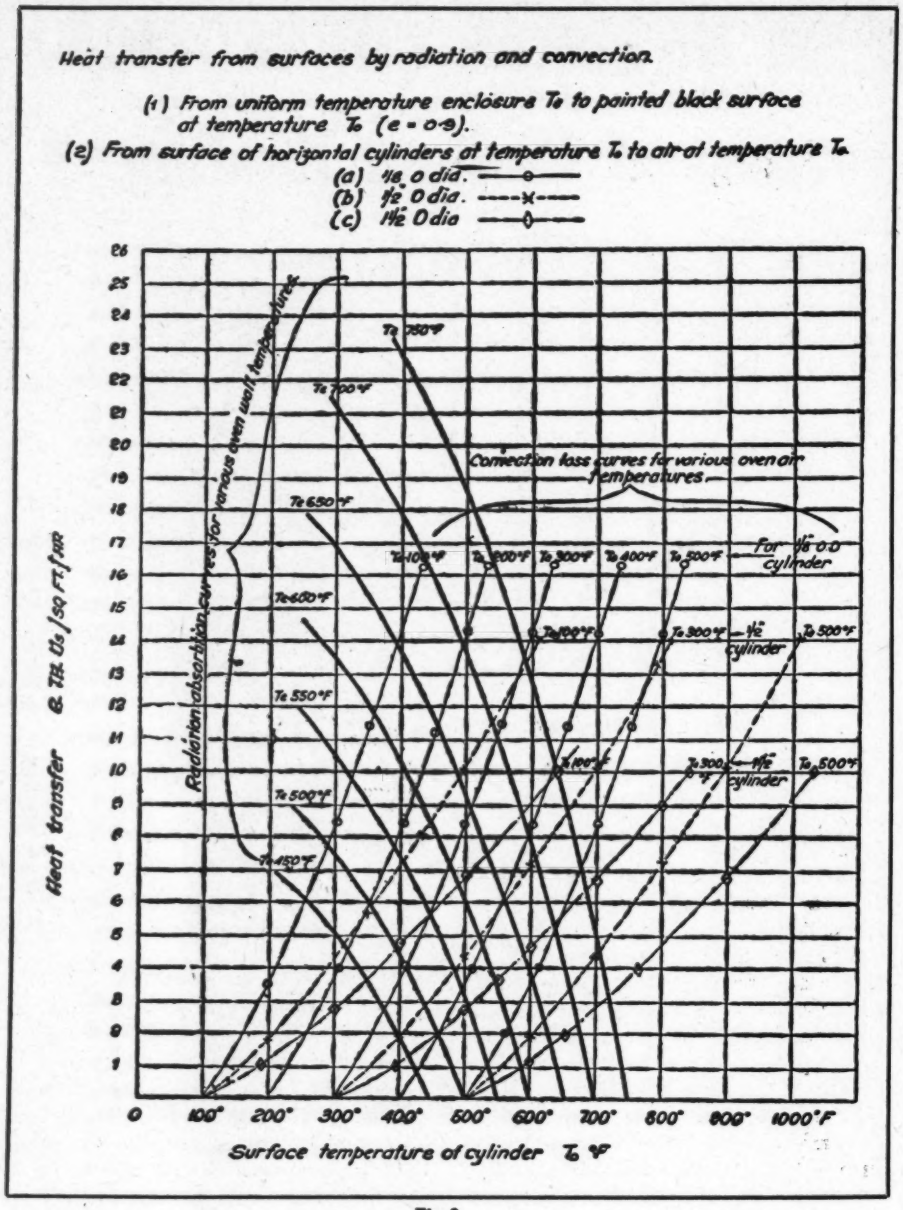
Heat transfer from surfaces by radiation and convection.
(1) From uniform temperature enclosure To to painted black surface at temperature Ts (e = 0.9).
(2) From surface of horizontal cylinders at temperature Ts to air at temperature To.
(a) 1/8" O dia.
(b) 1/2" O dia.
(c) 1 1/2" O dia
Heat transfer B.T.U./sq. ft./hr.
Radiation absorption curves for various oven wall temperatures
Convection loss curves for various oven air temperatures
For 1/8" O.D. cylinder
For 1/2" cylinder
For 1 1/2" cylinder
Surface temperature of cylinder Ts °F

Fig. 2

TABLE 1

Test	Article Treated, Dimensions	Air Temp. °F.	Oven Conditions Equivalent Radiant Temp. °F.	Time of Exposure Mins.	Paint Condition after Stoving
(A)	U Section rod 3/32 in. diameter	115	650	5	Very soft
(B)	U Section rod 3/32 in. diameter	115	650	15	Not fully hardened
(C)	2¼ in. O.D. tube, vertical and ends open	115	650	5	Not fully hardened but harder than (B)
(D)	2¼ in. O.D. tube, vertical and ends closed	115	650	5	Hard satisfactory
(E)	Flat plate, vertical 10 in. by 6 in.	115	650	2	Hard satisfactory
(F)	U Section rod 3/32 in. diameter	260	675	3	Hard satisfactory
(G)	2¼ in. O.D. tube-ends open—vertical	260	675	2	Soft
(H)	2¼ in. O.D. tube—vertical ends closed	260	675	2	Hard satisfactory
(I)	Flat plate vertical 10 in. by 6 in.	240	675	1	Hard

be expressed mathematically as follows:

Radiation absorbed per hour

$$H_R = K.E.(T_e^4 - T_o^4) \quad (1)$$

Convection loss per hour

$$H_c = A(T_o - T_a)^{5/4} \quad (2)$$

Where

H_R = Net heat transferred by radiation to the object in Btu/hr./sq. ft.

K = Radiation constant = 16×10^{-10}

E = Absorption coefficient of surface of object = (0.9 for black paint).

H_c = Heat loss by convection from object Btu/hr./sq. ft.

A = Convection coefficient (see Fig. 1).

T_o = Temperature of object ° F.

T_a = Temperature of ambient air ° F.

T_e = Equivalent radiant temperature of oven walls ° F.

The convective loss per unit area is greater for convex surfaces than for flat surfaces, the coefficient "A" increasing rapidly with increase of curvature for cylinders of less than 2 in. in diameter. The curves of Fig. 1, which show graphically the coefficient of convection "A" for horizontal and vertical cylinders and for flat plates of dimensions met in heat processing practice, have been constructed from published data. (1), (2)

Heat transfer by conduction being of negligible proportions, it is clear that at the equilibrium temperature the gain by radiation is balanced by the loss by convection and thus,

$$H_R = H_c$$

$$K.E.(T^4 - T_o^4) = A(T_o - T_a)^{5/4} \quad (3)$$

Since the radiation absorbed per unit area is independent of the curvature of a surface fully exposed to radiation from all directions while the heat loss by convection is greater for curved than for flat surfaces, it follows that convection losses play a greater part in determining the equilibrium temperature of curved objects than of those with flat surfaces. It also follows that reduction of convective loss by increase of ambient temperature will be more marked the greater the curvature of the surface.

The solution of equation (3) for the equilibrium temperature, T_o, of the object is conveniently found graphically by the intersection of the radiation gain and the convective loss curves constructed from the equations (1) and (2).

Such curves are drawn in Fig. 2 for the absorption of radiation and

TABLE 2

Oven Temperatures

Air Temp. Mid. Level °F.	*Radiant Panel Temp.* °F.	*Equivalent Radiant Temp. of Oven walls* °F.
360	780	455
120	930	510
230	970	530
360	930	565
500	970	575
150	1,170	630
230	1,140	675
125	1,290	670
130	1,380	720

the loss by convection for cylinders of various diameters held horizontally in ovens having various wall and air temperatures. The effect of change of oven wall and air temperatures on the equilibrium temperatures of cylinders and flat plates, as determined from the curves of Fig. 2, is seen in the curves of Fig. 3.

The Measured Effect of Convection on the Equilibrium Temperature and on the Rate of Temperature Rise

The Oven: An experimental replica of the gas-fired radiant heat cabinet illustrated diagrammatically in Fig. 4 was used for all measurements.

Oven air temperatures up to 250° F. were obtained by restriction of the ventilation of the oven by adjustment of the lower and upper openings of the cabinet. Oven air temperatures above 250° F. were obtained by burning gas in auxiliary burners placed inside the oven. The air temperature at low, middle and high levels in the oven, as indicated in Fig. 5, was explored, measurement being made by using a fine (38 S.W.G.) thermocouple over which the oven air was rapidly aspirated. At each level and at distances of more than 2 in. from the oven walls the air temperature was found to be constant to within 15° F.

Object Temperature Measurement: The test objects used for this purpose were copper tubes and flat plates each 16 in. long and painted black. The surface temperatures of them were taken at intervals of one minute by measurement of the E.M.F. developed in two fine (40 S.W.G.) thermocouples soldered to the objects at points 10 in. apart.

Radiating Panel Temperature Measurement: A 26 S.W.G. thermocouple secured to the radiating surface of one of the radiant panels was used to read directly on a calibrated voltmeter the temperature of the panel. The reading so obtained served as an indication of the mean temperature of the panel, which was found to be approximately directly related to the equivalent radiant temperature of the oven.

Paint Drying Observations: Tubes and plates painted with an oil base paint, and a synthetic heat transformable paint were heated in the oven having various panel and air temperatures. Results obtained were similar with both paints, and those recorded in Table 1 with an oil base paint can be taken as relatively typical.

Discussion of Results

The Equivalent Radiant Temperature of the Oven: As in the case of all ovens composed of unit heaters, the oven is not a uniform temperature enclosure, to which only the formula (1) is strictly applicable, and in consequence the equivalent radiant temperature of the oven is considerably below that of the radiating elements. Extreme difference between the equivalent radiant temperature of the oven and the actual temperature of the radiating elements is to be found in the case of electric lamp systems, where they may be of the order of 500° F. and 5000° F. respectively.

It is to be noted that undue advantage has been attributed to high temperature elements by authors who, while emphasizing the rapid increase of radiation per unit area with increase of temperature (as expressed in the 4th power law of radiation), have omitted reference to the accompanying incease in convective loss and reduction in radiating area of the filament which results from the use of smaller diameter filaments necessarily employed to obtain highter temperatures.

In the oven used for the tests the area of the radiant panels was approximately 15% of the total interior surface of the oven, and the highly reflective character of the remaining 85% of the surface appreciably raised the equivalent radiant temperature. From the measured equilibrium temperature of the cylinders and the corresponding ambient air temperatures it is deduced from the curves of Fig. 2 that the equivalent radiant temperature of the oven as used in the tests were as given in Table 2.

The Effect of Oven Air Temperature on Equilibrium Temperature: The curves of Fig. 5, constructed from experimental data, closely resemble the calculated curves of Fig. 4, and from them it is seen that at low ambient air temperature the equilibrium temperature of a cylinder decreases rapidly as the diameter of the cylinder decreases below 1½ in.

It is also evident that this difference between the equilibrium temperature of cylinders of various diameters increases as the radiant temperature of the oven is raised and decreases with increase in temperature of the ambient air. The observed relations between these factors for horizontal cylinders of ⅛ in. and 1⅝ in. diameter and for a ⅛ in. cylinder and a vertical plate are plotted in curves of Figs. 6 (a), 6 (b) and 6 (c).

Variation of Equilibrium Temperature with Orientation of Objects: The equilibrium temperatures of a flat

Calculated variation of equilibrium temperature with diameter of horizontal cylinders in ovens with various air and wall temperatures.

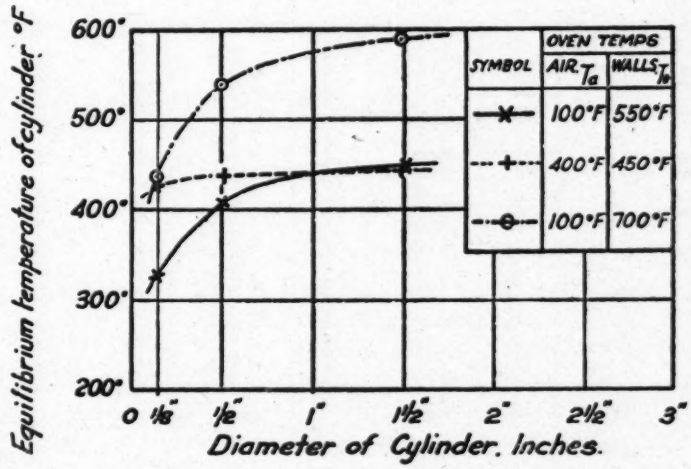

Fig. 3

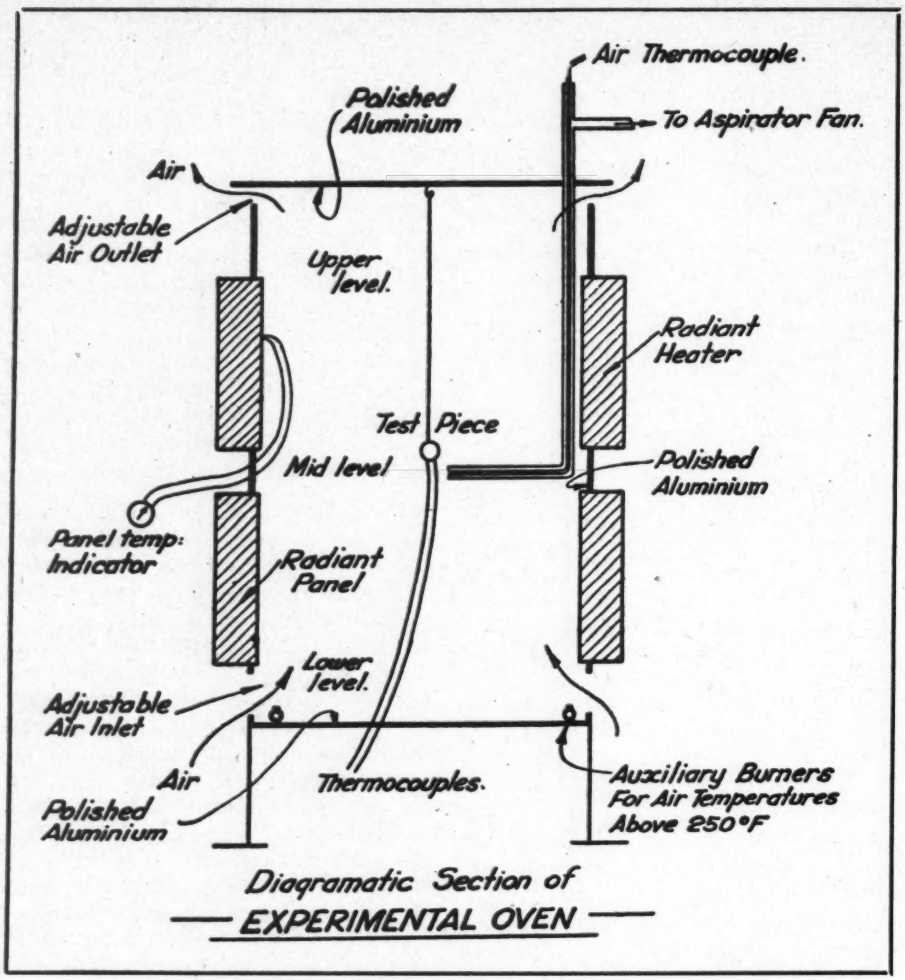

Fig. 4

Measured variation of equilibrium temperature with dimensions of cylinders and plates in ovens with various air and wall temperatures.

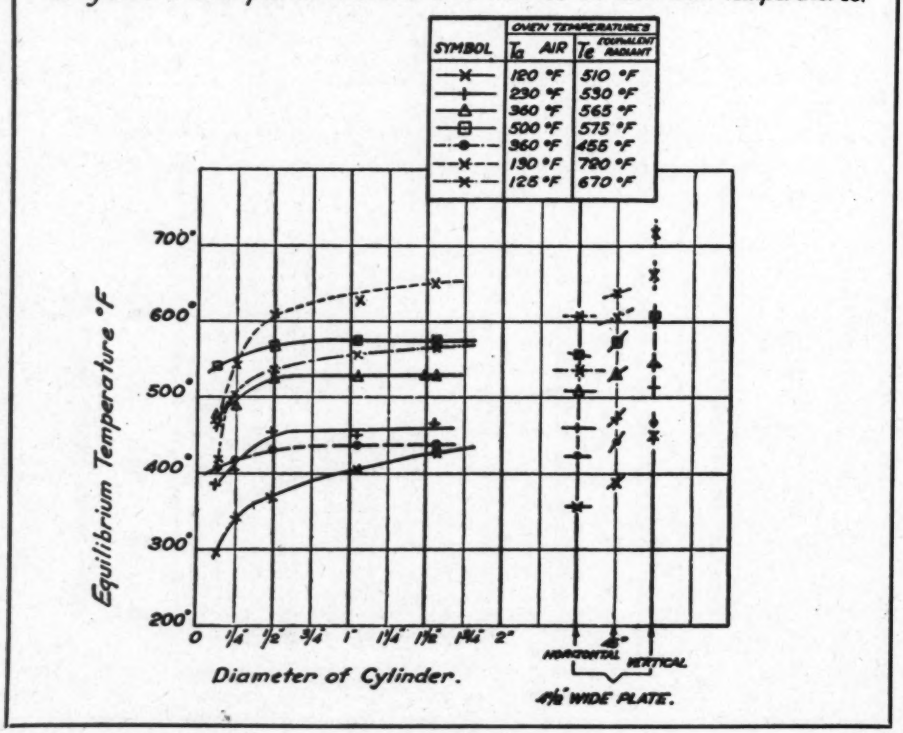

Fig. 5

plate 4½ in. by 16 in. when it was suspended with its long edge parallel to the radiant panels and with its short edge horizontal, at 45° and vertical, are plotted for various oven conditions on Fig. 7. It is to be noted that the equilibrium temperature of the plate when vertical was higher than for other orientations, and the difference was greater the larger the difference between the oven air and radiant temperatures.

The equilibrium temperature of a cylinder when vertical was observed to be higher than that of the cylinder when horizontal, the difference being greater for small diameter cylinders and for lower temperatures. These relative magnitudes are to be expected from convection data, except that in the case of vertical plates the equilibrium temperature is higher owing to the assymetry of the oven wall temperature distribution.

With the plate vertical and presenting a maximum projected area to the high temperature part of the oven walls and a minimum to the low temperature part, increase of absorption and reduction of emission of radiation are favored. Geometrical considerations show that when the plate is at 45° in a radiant heating system of the type used, its surface is symmetrically disposed to the oven temperature distribution, and in consequence the equilibrium temperature attained is more representative of the performance of the oven than that acquired by the plate when vertical.

Effect of Increase of Convective Surface: The equilibrium temperature of the U section rods was found to be lower than that of an equal diameter cylinder, due to the surface area from which convection occurred being greater than the area exposed to the radiating walls of the oven.

Similarly, the equilibrium temperature of an open vertical tube was lower than that of the same tube with its ends closed.

Effect of Ambient Air Temperature on Heating-up Rate: The "temperature-time" curves for ⅛ in. and 1⅝ in. diameter cylinders for two sets of oven conditions which respectively effect equilibrium temperatures of 450° F. and 550° F. for the 1⅝ in. cylinder are given in Figs. 8 (a) and 8 (b).

It is apparent that the rate of temperature rise for the larger cylinder is nearly the same for a high degree of "infra-red" radiation and low ambient air temperature as for a relatively medium intensity of radiation and a high air temperature, while in

the case of the small diameter cylinder the latter combination effects a faster rate of heating-up and a much higher equilibrium temperature, the latter being almost equal to that attained by the 1⅝ in. diameter cylinder when heated by either combination.

Processing Observations: Comparison of the temperature data and the observations of the drying of paints on various articles when subjected to the various oven conditions shows mutual confirmation of the effect of natural convection on heat processing. As to be anticipated, the effect is more evident in the case of typical heat transformable paints, the physical and chemical changes of which depend on the paint reaching a characteristic transformation temperature. The noted reduction in drying time from 30 minutes to 3 minutes in the case of an oil base paint on 3/32 in. diameter U section rods due to increasing the air temperature from 100° F. to 250° F. suffices to show that even with paints of such a wide temperature range of treatment the convection loss effect may play a decisive part in the successful treatment. Reduction of convection loss from the 2¼ in. diameter tube by closing its ends noticeably speeded the rate of drying, and raising the air temperature had a much greater effect on the rate of drying of the thin rod than that of either the flat plate or the 2¼ in. diameter tube.

Effect of the Magnitude of "E": In all the foregoing calculated and experimental data, the heated object has been one with a black surface, having a coefficient of absorption of 0.9. It is evident that for surfaces with lower value of "E," for instance polished metals, the absorption of heat will be proportionately smaller, and the role of convection correspondingly enhanced.

For short wave infra-red radiation the value of "E" varies appreciably with color. Maxted (3) showed that flat enamelled plates surrounded by cool air and heated by electric "infra-red" lamps attained equilibrium temperatures, depending on the color of the enamel, of from 200° F. to 280° F. Clearly such differences would be lessened by raising the ambient air temperature and practically eliminated by using air at the same temperature as the equivalent radiant temperature of the oven.

Significance of Observations: The differences in the maximum temperatures attained by flat and curved objects—in some cases shown to be as much as 150° F.—in ovens in which the heating is affected chiefly by "infra-red" radiation show clearly the importance of considering the convection losses from the object in order to obtain a correct estimate of the suitability of an oven for a particular process.

In processes, such as the curing of synthetic paints, where the heating period may be of the order of 4 minutes, it is evident that in an oven with an equivalent radiant temperature of, say, 520° F. and a low air temperature of, say, 100° F., the object temperature is more than the air temperature after the first few seconds of treatment and consequently for almost the whole period the rate of heating up is retarded due to the convection loss from the object. In the case of the oven with an equivalent radiant temperature of, say, 450° F. and air temperature of 360° F., heat transfer by convection to the object takes place for nearly half the heating period, while in the case of what is commonly termed a convection oven heat transfer from the oven air to the object takes place throughout the heating period.

It is clear from the foregoing comparisons of the characteristic performances of ovens having various proportions of convection and radiation components that a prime factor in the choice between convection and "infra-red" ovens which confronts every prospective user is curvature of the object of treatment.

For instance, a relatively high ambient air temperature is not only advantageous but essential for heating to 450° F. a rod of less than ⅛ in. diameter unless an equivalent radiant temperature of more than 720°

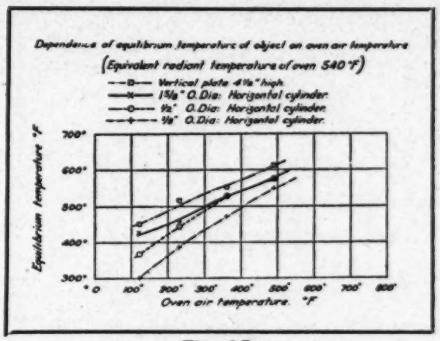
Dependence of equilibrium temperature of object on oven air temperature
(Equivalent radiant temperature of oven 540°F)
Vertical plate 4½" high.
1⅝" O.Dia. Horizontal cylinder.
½" O.Dia. Horizontal cylinder.
⅛" O.Dia. Horizontal cylinder.
Equilibrium temperature °F
Oven air temperature. °F

Fig. 6A

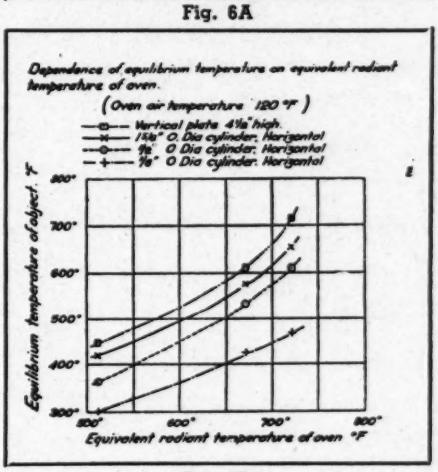
Dependence of equilibrium temperature on equivalent radiant temperature of oven.
(Oven air temperature 120°F)
Vertical plate 4½" high.
1⅝" O. Dia cylinder. Horizontal
½" O Dia cylinder. Horizontal
⅛" O Dia cylinder. Horizontal
Equilibrium temperature of object. °F
Equivalent radiant temperature of oven °F

Fig. 6B

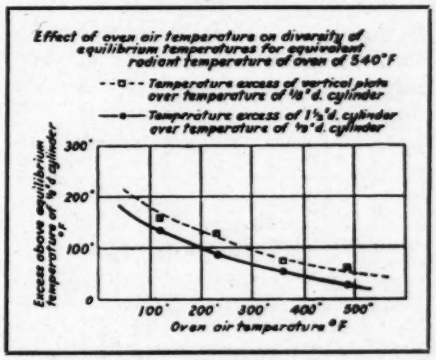
Effect of oven air temperature on diversity of equilibrium temperatures for equivalent radiant temperature of oven of 540°F
Temperature excess of vertical plate over temperature of ⅛"d. cylinder
Temperature excess of 1½"d. cylinder over temperature of ⅛"d. cylinder
Excess above equilibrium temperature of ⅛"d cylinder °F
Oven air temperature °F

Fig. 6C

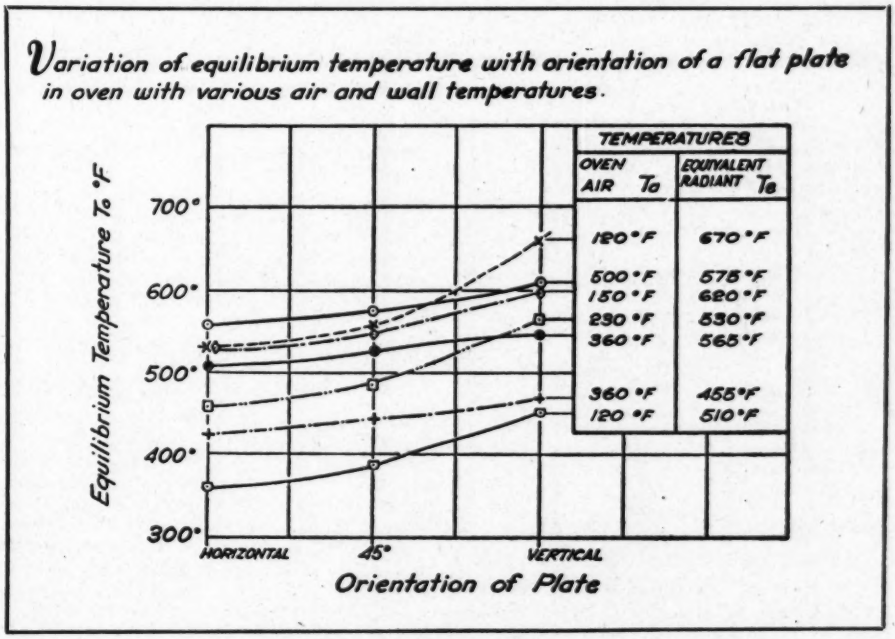

Fig. 7

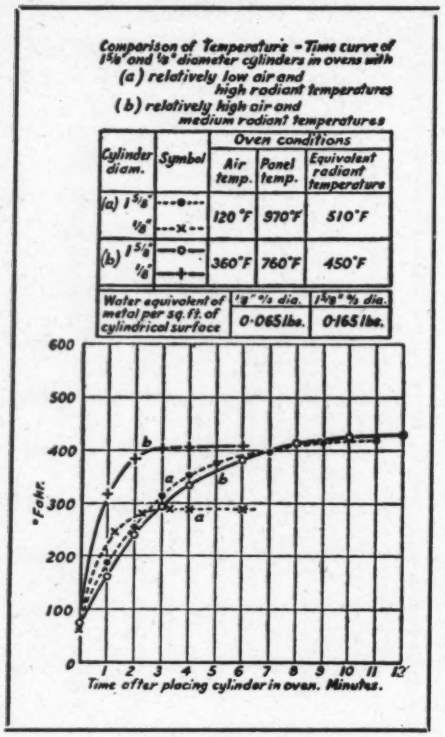

Fig. 8A

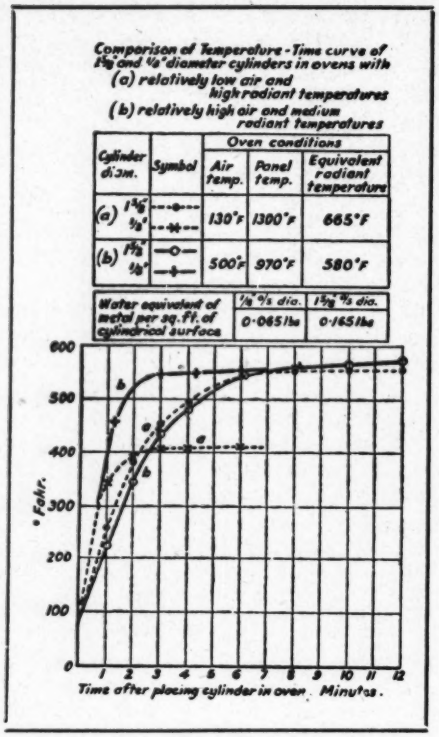

Fig. 8B

F. is used. Since, too, the rate of heating-up of flat objects differs little whether a low air temperature and a high equivalent radiant temperature or high air temperature and medium radiant temperature are used, it is apparent that ovens intended for heating various size objects, ranging from, say, small diameter tubing or wire to flat surface objects, should be of the latter type in order to obtain uniform effectiveness.

The marked difference in the attainable temperature of various objects and the high equilibrium temperature of a vertical flat plate, especially with unidirectional radiation, makes caution necessary in using the suspended plate for testing the performance of heating equipment. As a result of the observations recorded in this paper, it is suggested that specification of the performance of ovens should include the equilibrium temperature and temperature-time curves of cylinders ⅛ in. O.D. and 2 in. O.D. and of a specified gauge and metal, suspended horizontally.

ACKNOWLEDGMENTS

The author is indebted to Mr. L. R. Hickson, B.Sc., A.R.I.C., chief chemist of Messrs. Hadfields (Merton), Ltd., for drawing his attention to the anomalous paint drying results which initiated the investigation, and for the carrying out of the paint drying tests.

The valuable assistance given in the experimental work by the author's colleagues, Mr. W. S. Harmer and Mr. G. J. Long, is also acknowledged.

The experimental work was carried out in the physical laboratory of the South Metropolitan Gas Company, and the author wishes to thank Mr. Dean Chandler for his interest in the work, and Dr. E. V. Evans, general manager and director, for granting permission to publish the paper.

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(2) *Heat Loss by Natural Convection from Vertical Cylinders.* Phil. Mag., Vol. XXIV, p. 634. Oct. 1937. J. B. Carne.

(3) *Trans. Ill. Eng. Soc.* Vol. VII, No. 1, p. 10 (1942). R. Maxted.

Kansas-Colorado Utilities Takes Over Central Gas

The Kansas-Colorado Utilities Inc. is a new corporation formed to purchase and operate gas properties formerly owned and operated by the Central Gas Utilities Co. of Abilene, Kan. Kansas-Colorado owns and operates distribution plants in four towns in Kansas and 10 towns in Colorado, as well as transmission lines and producing gas wells.

The operating office is located at Lamar, Colo., and principal officers are Reece E. McGee, president; H. E. Waring, vice president; C. L. Wright, secretary-treasurer; and Gene Munson, auditor.

B. C. Electric to Build Water Gas Unit

British Columbia Electric Railway Co., Ltd., plans to build a new carburetted water gas unit at its False Creek gas plant site in Vancouver, B. C. The company also plans to build a 150,000 gal. oil storage tank above ground level for gas enrichment.

New Jersey Commission Announces Rate Ruling

The New Jersey Railroad Commission, in the case of the Salem, (N.J.) Gas Co., which had increased the heating value of its gas supply from 530 to 742 Btu's, made the following ruling: An increase in heating value per cubic foot of gas through the substitution of propane-air gas for manufactured gas is a reasonable basis for increasing or "restating" a gas utility's rates so as to reflect the increased heating value.

Consumers Power Sells Sault Ste. Marie System

Dan E. Karn, vice president and general manager, Consumers Power Co., Jackson, Mich., has announced the sale of the company's gas plant and distribution system in Sault Ste. Marie to the new Sault Gas Co. The Sault system, acquired in 1934, was the only Consumers property in the Upper Peninsula of Michigan. Purchasers are Ray S. Weidenfeller, B. L. Launstein and Laurence R. Gould of Jackson, and John M. Carter of East Lansing.

$9 Million Program Planned To Conserve Casinghead Gas

Officials of Humble Oil Co. and Stanolind Oil and Gas Co. have announced that they will spend nearly $9 million to conserve casinghead gas now being flared in Texas fields. Rex Baker, Humble director, said his firm will spend $4,872,000 to conserve 60.7 million feet of gas wasted daily in 11 fields. G. C. Condra said Stanolind will spend $4 million to utilize 25 million feet of gas wasted daily in the Hastings field.

FPC Approves New Rates For Natural Gas Pipeline

The Federal Power Commission announced Feb. 26, its approval of new rate schedules filed by Natural Gas Pipeline Co. of America, Chicago, which will (1) provide a refund aggregating $2,334,319 to ultimate consumers who purchase gas from 11 companies serving Illinois, Iowa, Kansas, and Nebraska communities which in turn purchase gas from Natural Gas Pipeline and (2) reduce the cost of natural gas to the 11 companies by $687,955 annually in the future.

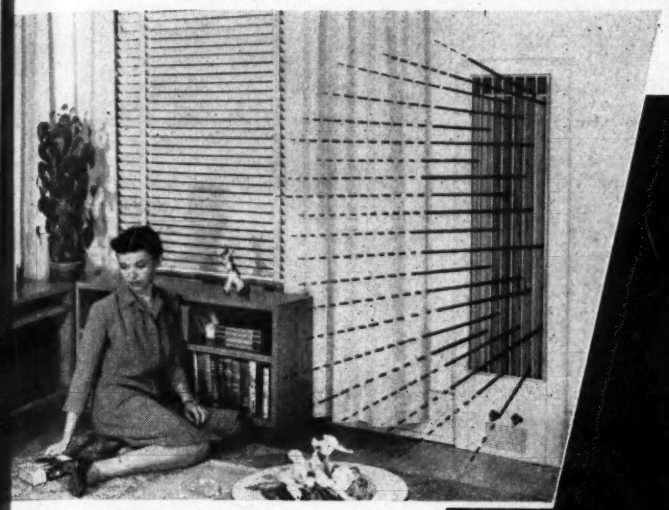
Program Outlined For Measurement Short Course

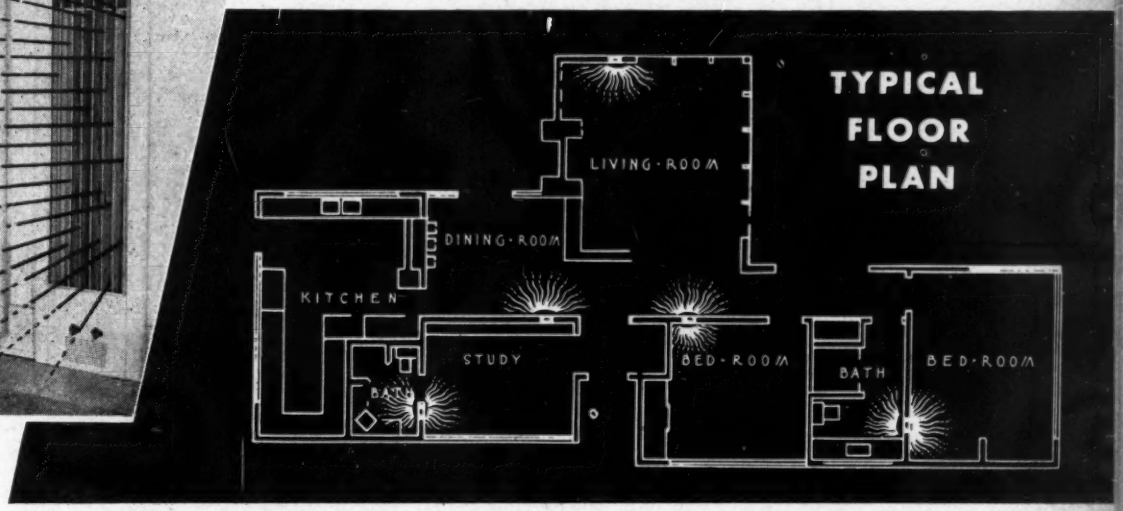
The general committee of the Southwestern Gas Measurement Short Course at a recent meeting in Oklahoma City, Okla., outlined the program for the 1946 school to be held at the University of Oklahoma, Norman, April 23, 24 and 25.

R. M. Scofield, chairman of the program committee, reports that manufacturers of natural gas measurement equipment will cooperate with the gas and oil industries and with the College of Engineering, University of Oklahoma, in furnishing instructors and exhibits.

W. H. Woods announces that at least one more Practical Methods report will be available for distribution during the short course.

Sales Pointers . . . on New GAS Appliances





The PANELRAY HEATER

Manufacturer: Day & Night Mfg. Co., Monrovia, Calif.

Construction and Operation: The heat panel is vertical and body height, enabling it to radiate infrared heat rays directly into the living zone of the room. These infrared rays travel at the speed of light and actually penetrate the blood stream before the air is warmed. Due to these penetrating rays and vertical installation of the heater, there is constant, even distribution of heat from floor to ceiling, eliminating drafts and cold floors. The secret of its operation lies in the design of the heating element which consists of a series of convolutions or indents to baffle the upward sweep of hot combustion products. This arrested heat is radiated outward into the room. The combustion products pass out the vent to atmosphere. These convolutions or indents increase the heat intensity of the radiating surface, but below the point of incandescence, so that a maximum amount of the radiation is in the form of infrared rays.

Sizes are as shown in Table. Dual installations are shown in typical floor plan.

ANSWERS TO CUSTOMER'S QUESTIONS

1. By installing a heater in every room would the cost for installation and operation be more or less than a central heating system?

ANS: By using dual models for adjacent rooms, the installation cost should be less; the operating cost would be less because of their adaptability to controlled zone heating, the quicker sensible heat for short period heating requirements, and the lower ceiling temperatures existing with radiant heating.

2. Would each heater require a separate flue?

ANS: Yes, except dual installations which have one, common vent.

3. By what means is the heat forced into the room, radiation or forced air?

ANS: Radiation principally; convection to a lesser degree.

4. What is the price range of the heater?

ANS: Prices of heaters range from about $35 for a small single model to $100 for the larger dual models.

5. Are they available now?

ANS: Yes. While the supply is limited now, they will be available in increasing quantities.

6. Who is authorized to install them?

ANS: Any licensed heating contractor.

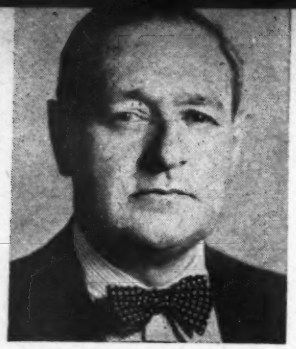
SELLING POINTS

1. Heats the body before heating the room.
2. Free from drafts because not dependent on hot air circulation.
3. Even heat distribution—warm floors.
4. Completely vented to prevent formation of water vapor on windows and room furnishings.
5. Body height heat.
6. Minimum heat loss as infrared rays are thrown directly into the room from heat trap.
7. Thermostatic control, if desired.
8. Dual installations for adjoining rooms.
9. May be installed anywhere upstairs or down—in new homes or old.
10. No loss of floor space.
11. May be installed in corners.
12. Clean heat.
13. Easy to start.
14. Accessible.
15. Odorless and noiseless.
16. Attractive appearance, harmonizing with room furnishings.

DIMENSIONS AND SPECIFICATIONS

Model	Btu Input Nat. & Mfg.	Dimension Height	Dimension Width
Single			
10 WP*	10000	59⅜"	13-3/16"
20 WP*	20000	59⅜"	17-11/16"
30 WP*	30000	59⅜"	21-3/16"
Dual			
10-10 WP	20000	59⅜"	13-3/16"
10-20 WP	30000	59⅜"	17-11/16"
20-20 WP	40000	59⅜"	17-11/16*

*Adapter for corner installation available.



PROMOTIONAL NOTES and NOTIONS

By STANLEY JENKS

South of the Border

These notes are written in Mexico. Not in Mexico City, the mecca of American tourists, but no more the real Mexico than New York typifies the United States. The real Mexico is difficult to find for the average traveler because it lies off the tourist-beaten paths, and is almost inaccessible because of poor roads, if any, pathetically uncertain railroad schedules and haphazard air facilities.

These notes are being written on the shores of a rock-bound cave on the Pacific coast of the State of Sonura.

Business—not "monkey" business either—brought me here and being an inveterate utility man, what was more inevitable than that I should snoop into utility matters here?

Of course, there is little conventional gas service beyond the border regions. Mexico City itself uses LP-Gas, if any, and from talks with residents, there will be a tremendous load available, if, when and as natural gas can be piped in from the Tampico oil fields.

As it is, it is remarkable the number of stores that sell gas ranges, hardware, furniture and even drugs and groceries. As I get it, the three electric companies serving Mexico City are not so "hot". Voltage regulation is poor, especially in the better residential districts, the logical market for ranges. Every home I visited had "bottled" gas for cooking.

Out of Mexico City, the utilities I have visited have been electric, or combinations of electric, water and ice.

The thing that impressed me most was the unfailing courtesy at all levels. As one general manager put it, in his excellent English, "As a public utility man, to please people is the first object." This was in answer to my protests, when he insited on dropping everything to show me (a total stranger) the territory served. And though the sun was hot, the roads rough, and the gasoline situation tight, he took a couple of hours to be sure that I would appreciate everything—results as well as difficulties. His American training had gone a little further than it does in most instances at home.

Political Ownership

Those starry-eyed, but otherwise normal, citizens of ours who see a step near paradise in the public ownership of utilities, should spend some time—only a few days would be plenty—riding the government-owned railroads of Mexico. Apart from the questions of aptitude, and please don't sell short Mexican privately-owned business ability, either technically or commercially, the politically operated railroads in Mexico beggar description. Loaded freight cars from the U. S. disappear for months at a time. Passenger trains are run so haphazardly that the only purpose a timetable has is to assure you that a train will run sometime and eventually go where you wish to go. It is a common fallacy that the trouble lies with the highly unionized workers who supposedly operate entirely at their own personal convenience. However, a higher official explained to me that a complicated bureaucratic organization, reeking with politics, really was responsible for gumming up the works so thoroughly. Creating jobs for political cohorts is far more essential than the public welfare in the minds of the political bosses, who grabbed control when the State took over the railroads.

Those of us, who in the course of duty, have had to tangle with Washington and New Deal bureaucratic idealogy, have every reason to be apprehensive. The American public, far longer suffering than the Mexicans, by the way, is going to get it plenty in the neck if Washington's proclivity for wanting to control (that is, run) everything is not severely curbed.

Of course, you don't have to come to Mexico to arrive at these conclusions, but coming here and finding the terrible realities of political ownership of utilities, emphasizes the grim reality of its impracticability.

Mexican Merchandising

In another instance, I questioned the lack of merchandise on display by the utility, because along the main street I had seen far more appliances on display in stores than you would see today in an American city of twice the size. All standard American items, too, which in itself creates a question mark too exasperating to answer here.

The manager said they cut out merchandising because it creates too much ill-will among merchants in town "who make their living selling and servicing appliances."

Latin logic, if you please; refusing to let a dubious dollar appliance profit blind itself to the real source of its public utility income. And don't think for one minute that the load was suffering. The average kwh per customer compared favorably with a similar operation in the United States, and in fact was held down solely by a shortage of distributing and generating material.

Personal Notes

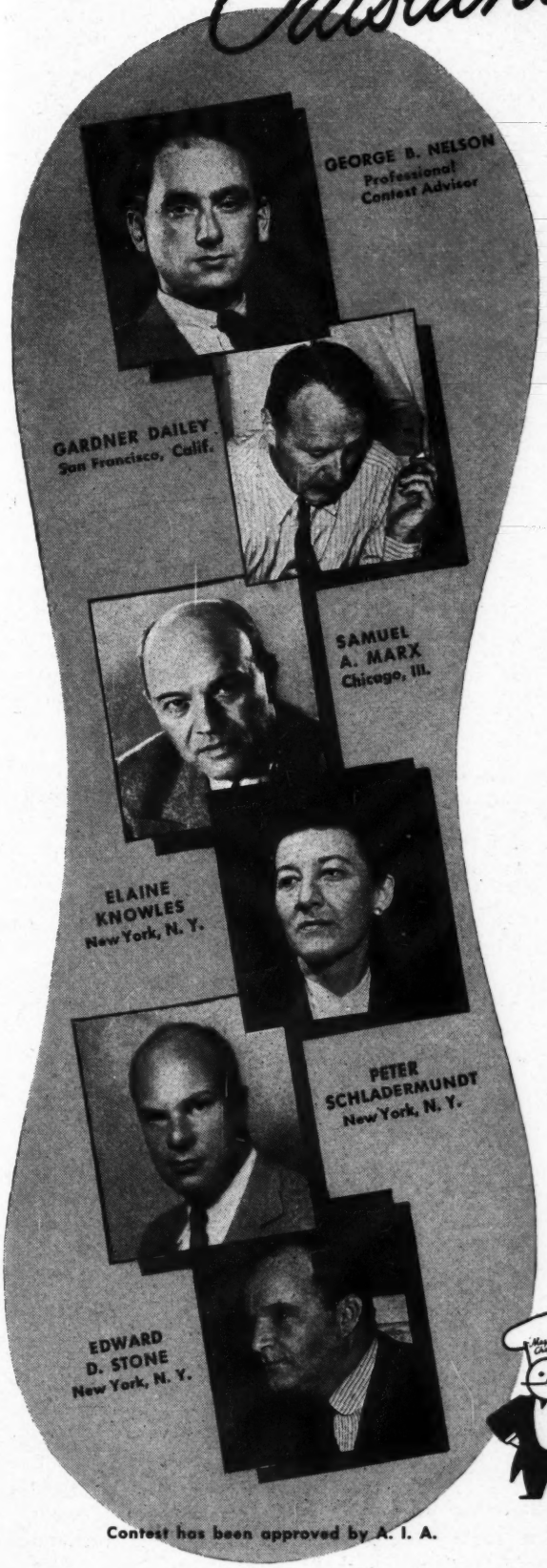
The Mexicans I have met are anything but envious of the United States. They have read of our paralyzing strikes, looking more like revolution to them; our food shortages compared with their land of plenty; and our threat of industrial chaos because of inepitude in Washington. They got their revolution over with in 1929. Their business men are intelligent, progressive and appreciative of the opportunities ahead.

They have a country rich in agricultural possibilities, and potentially industrially wealthy, because it is well blessed with natural resources.

The revolution ended once and for all foreign exploitation of these resources. The Mexicans admittedly have technical help from outside for which they are willing to pay. They also recognize their own deficiencies—encouraging in itself—and are building schools, fostering popular education on a very impressive scale. Rome was not built in a day and neither will the modernized Mexico envisioned by its leaders be built by tomorrow.

Outstanding Authorities

to Decide Winners of *Magic Chef* Design Competition



Contest has been approved by A. I. A.

The ARCHITECTURAL FORUM, sponsor of the Magic Chef Design Competition, has named an eminent board of judges to decide the winners of the $18,000 cash prizes for the best designed gas range of tomorrow.

This board consists of four of America's most prominent architects and a leading home economist. A record of the personal ability and fame of these individual judges would fill a book; hence, it must suffice to say that collectively they represent a board whose fitness for the important task assigned them could not be surpassed by any other similar group in the United States.

The overwhelming number of contestants from all walks of life who have entered this competition is assurance that the designs submitted will represent a cross-section of American opinion almost impossible to obtain by any other method—The highly skilled board of judges assures an impartial selection of winners based strictly on the merit of the designs submitted—The ultimate hope—A finer, more beautiful, more efficient Magic Chef than ever before—Truly the gas range of tomorrow, ready to play its part in a world that will be filled with the wonders of Gas.

AMERICAN STOVE COMPANY

4301 Perkins Ave. • Cleveland 3, Ohio

NEW YORK • ATLANTA • PHILADELPHIA • CHICAGO
CLEVELAND • ST. LOUIS • LOS ANGELES

Magic Chef

RED WHEEL GAS RANGES AND HEAVY DUTY GAS COOKING EQUIPMENT

THE GAS RANGE WITH THE FAMOUS RED WHEEL

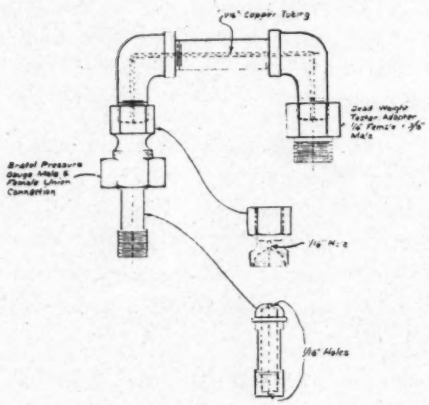
OPERATING IDEAS

Connection For Dead Weight Gauge Tester

HARRY WILSON, Oklahoma Natural Gas Co. Presented before the 1945 Wrinkle Class, Southwestern Gas Measurement Short Course, conducted by ROY S. PEACE, Jr., Southern Natural Gas Co.

In testing a number of pressure elements with a dead weight gauge tester a great deal of oil is required to fill the ordinary ¼-in. pipe connections. This soon depletes the supply in the dead weight and refilling is required very often. With the connection described here a very small amount of oil is required to fill the piping and the pressure can be built up very rapidly.

This connection consists of standard ¼-in. pipe fittings with a small



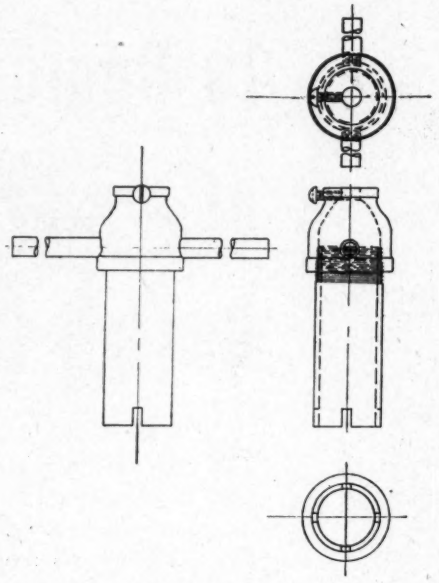
pressure tube inside and sealed at both ends with solder. The union connection on the end also has a very small bore and a few drops of oil fill the whole system. The ¼-in. fittings act only as a support and come in contact with the oil only at the end threads. Very little oil is left in the connection to spill out when changing the springs to be tested.

Tool For Grinding Regulator Valves

H. RAY TAYLOR, Cities Service Gas Co. Presented before the 1945 Wrinkle Class, Southwestern Gas Measurement Short Course, conducted by ROYY S. PEACE, Jr., Southern Natural Gas Co.

This tool is for use in grinding the valves in a Chaplin-Fulton high pressure regulator.

It is made of a ½-in. nipple, a ½-in. x ¼-in. reducer and two ¼-in. nipples about 6 in. long. The reducer is bored out at the small end to take a valve stem. The slots in the open end of the 1½-in. nipple go over the pin holding the valve on the stem, and the set



screw in the small end of the bushing is set against the stem holding the tool in position.

Regulator Stop

EDWARD SACKETT, Southern Carbon Co. Presented before the 1945 Wrinkle Class, Southwestern Gas Measurement Short Course, conducted by ROY S. PEACE, Jr., Southern Natural Gas Co.

After turning the head of a weight and lever operated regulator so that the beam runs parallel to the piping, a very practical stop can be used, which clamps to the pipe.

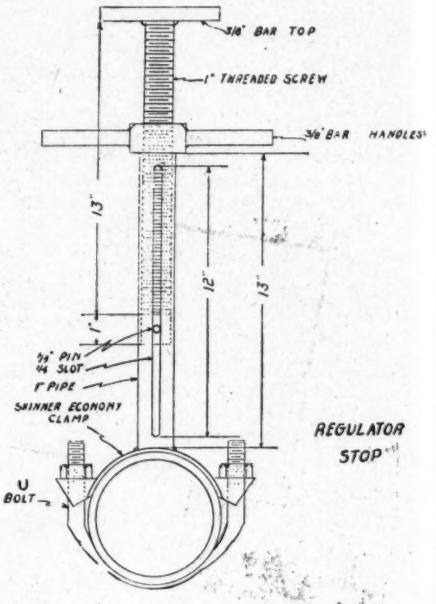
These stops will prevent the regulator from opening beyond a set point in case of diaphragm failure, or will limit the flow from wells that operate on set quotas.

The stop consists of a threaded screw 13 in long and 1 in. of blank. A nut with ⅜-in. bar iron welded on top for the regulator beam to rest on.

The screw is then put inside a piece of 1-in. pipe 13 in. long, in which there has been cut a ¼-in. slot 12 in. long. Drill a hole in the blank end of the threaded screw and drive a ¼-in. pin into it. The pin now slides up and down in the slot, keeping the screw from turning while the nut forces it up or down to the desired position.

The bottom of the 1-in. pipe is then welded to a Skinner economy clamp to fit any size of pipe.

Either the other half of the Skin-

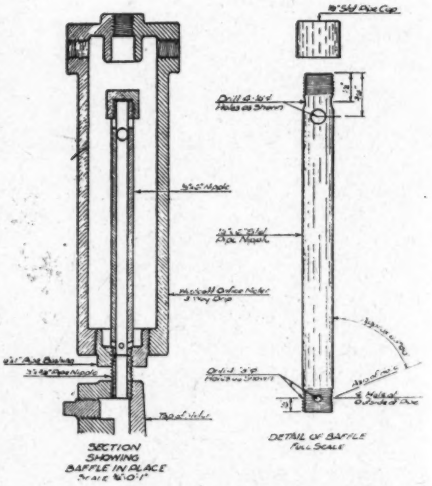


ner clamp or a U bolt will hold the stop in place.

Automatic Mercury Catcher and Meter Re-Filler

C. F. COX, Phillips Petroleum Co. Presented before the 1945 Wrinkle Class, Southwestern Gas Measurement Short Course, conducted by Roy S. PEACE, Jr., Southern Natural Gas Co.

This is a conventional mercury catcher, manufactured by Metric Metal Works, with a nipple and cap as shown in sketch added. This nipple acts



as a baffle to check and keep the mercury from being blown back through the meter lines. It also allows the mercury to drain back into the meter.

This mercury catcher is useful on services where there is a chance for back flow.

The MAGNETIC INSPECTION SYSTEM

Its Use in Utility Automotive Maintenance

IN the automotive maintenance division of the Pacific Gas and Electric Co. a proven method of inspecting has been initiated. To facilitate checking for small cracks in iron and steel parts that eventually lead to fatigue failure, the maintenance division adopted the "Magnetic Inspection System." This system has been used very extensively in the manufacturing industry, principally under a licensed system known as "Magnaflux".

The system used by Pacific Gas and Electric Co. is the same in principle but the company has developed its own magnetic powders for the purpose. The equipment used in a typical application of the magnetic inspection system is illustrated in Fig. 1. The parts needed are listed as follows:

1. A 6-volt, SLI storage battery—charged.

2. A suitable length of copper cable, as a 10-ft. length of No. 4 insulated—extra flexible.

3. A suitable switch, as an automotive starter switch.

4. Suitable connectors. Ordinary ¼" x 3" steel cotter pins are very satisfactory.

5. A small supply of magnetic powder in a suitable shaker with perforated top.

How It Works

All of the so-called "fatigue failures" start in the outer fiber or surface of the part and progress, usually quite slowly, to final failure. By magnetizing the part, any very slight interruption in the continuity of the metal surface diverts the magnetic flux and produces poles adjacent to the interruption. If certain types of magnetic powders are sprinkled on the part they will become concentrated at that point, thus indicating its location. A standard procedure for inspection should be followed as outlined in Table 1 to insure maximum efficiency in the use of this system.

Parts in which defects are indicated should be replaced or repaired, although very minor defects may not require immediate action. Certain parts, however, should be checked at regular intervals as shown in Table 2.

Repairs may be made by removing the metal that contained the defect,

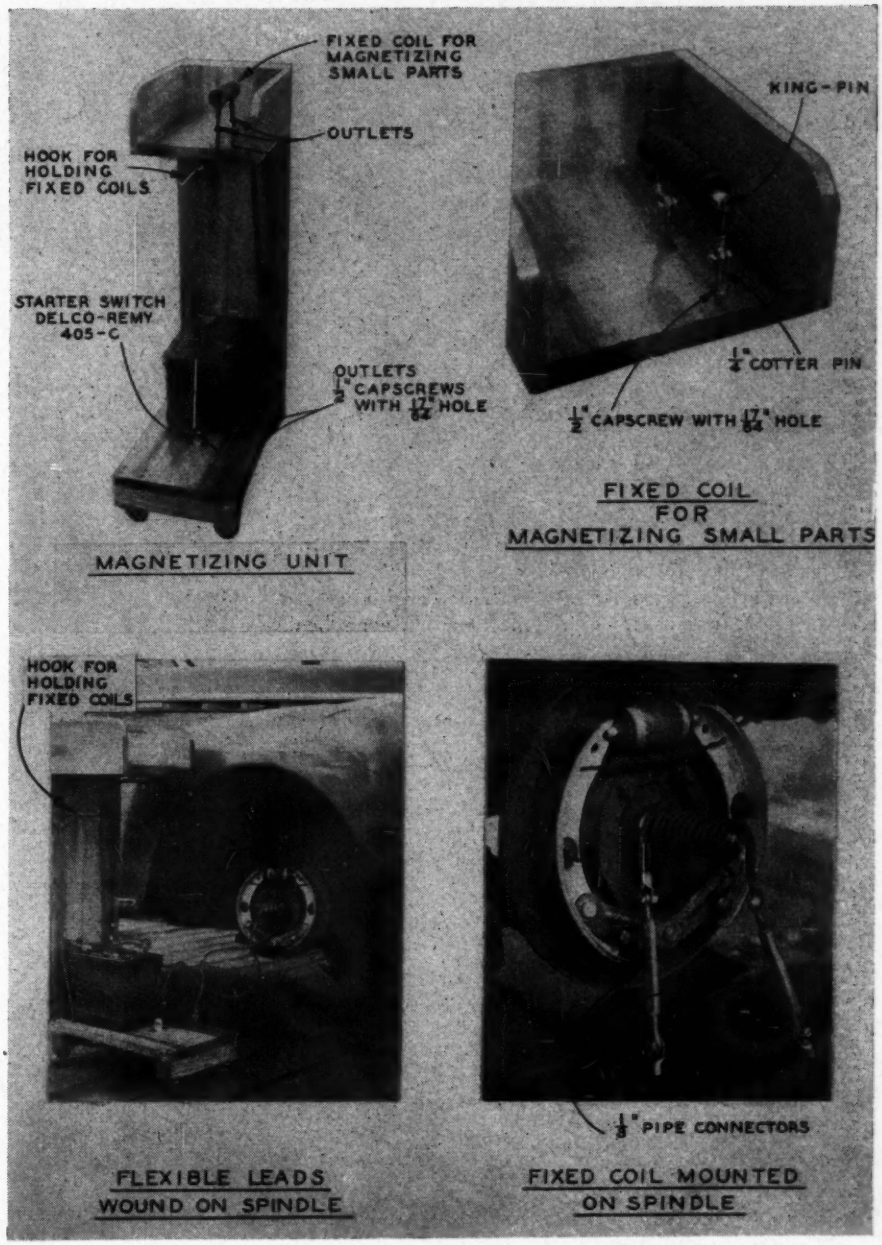

FIXED COIL FOR MAGNETIZING SMALL PARTS
OUTLETS
HOOK FOR HOLDING FIXED COILS
STARTER SWITCH DELCO-REMY 405-C
OUTLETS ½" CAPSCREWS WITH 17/64" HOLE
MAGNETIZING UNIT
KING-PIN
¼" COTTER PIN
½" CAPSCREW WITH 17/64" HOLE
FIXED COIL FOR MAGNETIZING SMALL PARTS
HOOK FOR HOLDING FIXED COILS
FLEXIBLE LEADS WOUND ON SPINDLE
⅛" PIPE CONNECTORS
FIXED COIL MOUNTED ON SPINDLE

Fig. 1. Equipment Used for Magnetic Inspection.

TABLE 1. PROCEDURE FOR MAGNETIC INSPECTION

1. Remove such small attached parts as nuts, washers, etc., and clean the part so that it is free from oil, grease and dirt. It is not necessary to remove moderate paint, scale or rust.

2. Wrap approximately 10 turns of the flexible cable about the part.

3. Connect ends of cable and close switch for a second or two. This will result in a magnetizing force and will permanently magnetize most automotive parts. Magnetization should be checked with a piece of light soft steel.

4. Sprinkle powder on part, particularly at critical points where failure is most likely to occur. Part may be vibrated with a hammer or excess powder may be lightly blown off. If there is an interruption in the surface, the powder will adhere at that point.

CAUTION: Operators should keep good watches away from the magnetic field which is produced as it may magnetize the watch hair spring. Should that happen any watchmaker can demagnetize it or it can be demagnetized with a "growler". A magnetized watch gains time.

and replacing it by electric welding after which the surface should be refinished and the piece rechecked by the magnetic method. In case failures occur or faults are discovered in any certain parts, similar parts subject to the same service conditions should be checked to the extent warranted by the conditions. Where used parts have been obtained by "exchange" they should be checked before being installed.

TABLE 2. PARTS TO BE CHECKED REGULARLY.

To be checked at intervals as indicated.

1. Front axle spindles, 25,000 miles or less; front axle steering arms, 25,000 miles or less; front axle king pins, 50,000 miles or less; rear axle shafts ½ x ¾ floating outside of bearings, 25,000 miles or less; rear axle shafts—entire shaft, 50,000 miles or less; rear axle spindles, 50,000 miles or less; trailer axles—solid tires, 5 years or less; trailer axles — pneumatic tires, 10 years or less.

To be checked whenever parts are accessible for checking.

2. Engine crank shafts and cam shafts. Engine connecting rods, rod bolts and caps. Engine piston pins and valve stems and heads. Universal joints, arms, bolts, and pins; drive shafts. Springs may be checked "in place" and without disassembly.

How To Improve Employee Discipline

ONLY one company out of five has a formal code of rules and regulations governing employee conduct on the job—and even fewer have any systematic procedure for dealing with infractions. This condition was brought to light in a recent survey by the Labor Relations Institute, which now prescribes the remedy via a special report to its members, entitled "How to Improve Employee Discipline."

This advice is supplemented in the report with a series of charts and checklists. One, a four-page check-chart on infractions, names 38 separate violations, classifying each according to degree—major, minor, and intolerable — and gives the recommended penalty. Offensives range from reading on the job, a "minor" infraction, to drinking on the premises and immoral conduct. The latter are rated as "intolerable" and punishable by immediate discharge.

Seven basic steps must be taken in order to insure lasting and equitable "tightening up" of discipline, according to this report. These steps, which are explained in detail in the text, may be summarized as follows:

1. Set up written rules and regulations.
2. Make them reasonable.
3. Formalize the penalties.
4. Distinguish between major and minor offenses, so that punishment may fit the crime.
5. Publicize the rules to employees, foremen, and executives.
6. Use printed warning forms to notify offenders after each infraction. Keep a record of such warnings.
7. Train supervisors to investigate every situation thoroughly before imposing a penalty.

"I know it's your New Freedom Gas Kitchen, dear, but . . . "

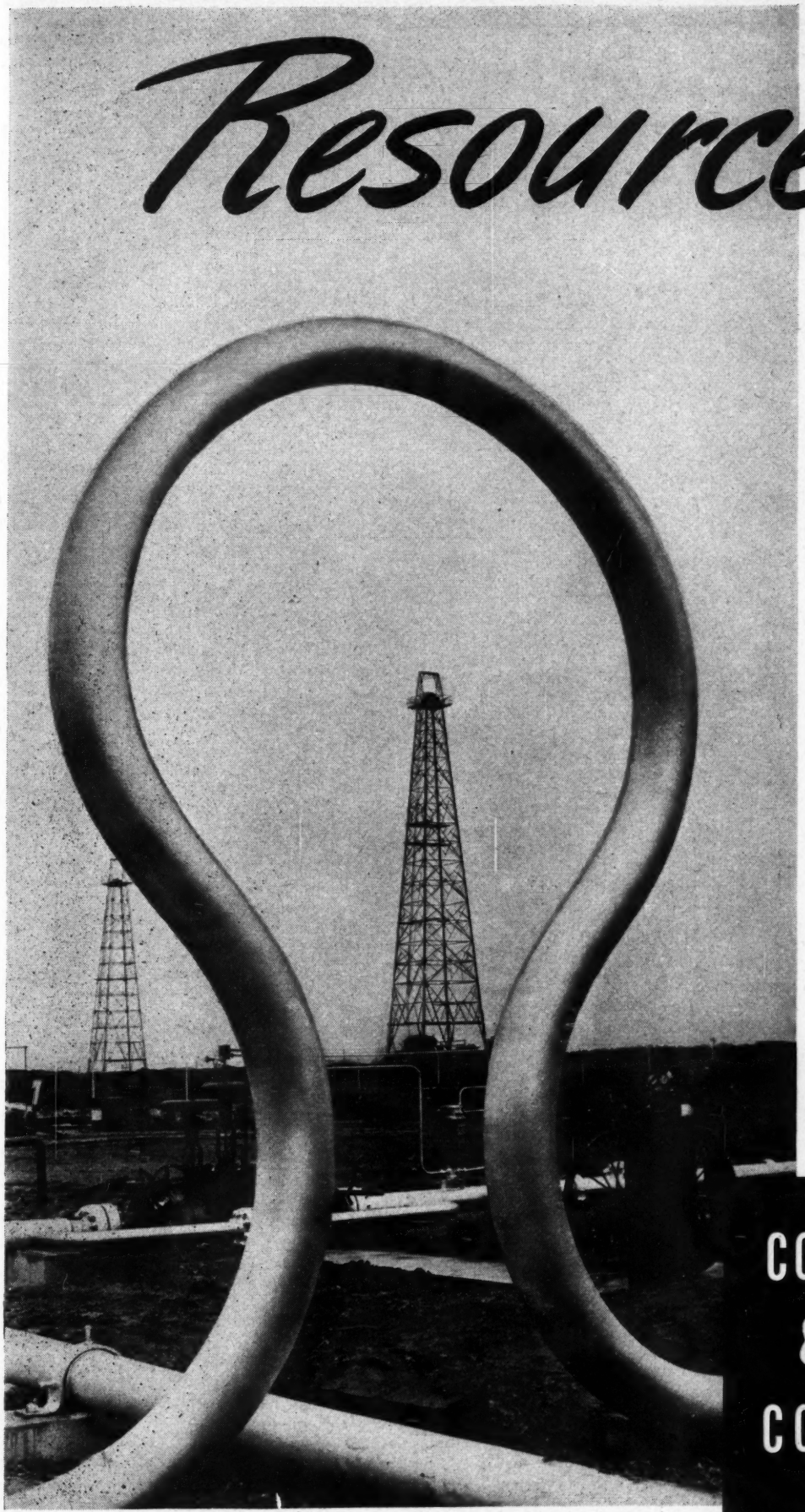
Courtesy So. Calif. and So. Counties Gas News.

Another important feature of the report is the recommended warning form, which is reproduced in full detail for readers to copy or adapt. It contains all essential information for employee, supervisor and personnel department. The presentation of rules and regulations in the foreman's manual is also fully illustrated, along with a detailed list of questions which the supervisor should ask himself when faced with an enforcement problem.

"No warning form, of and by itself, will correct an employee's bad habits," the editors concede. "Training, proper corrective measures, and good follow-up will help to put offenders back on the proper path. But the warning notice is an important adjunct. It not only serves as a record which can be produced if necessary to refute charges of unfair labor practice, but it also proves extremely helpful when considering employees for promotion or transfer."

The union angle and the relation of discipline to collective bargaining are covered in the report, which tells management how to protect its prerogatives through proper wording of the contract provision governing company rules and their enforcement.

Resources...



THE GAS-BORN flame of the kitchen range is an every-day phenomenon.

Behind it lie the resources of a phenomenal industry.

They are the vast, untapped reserves of natural gas . . . the thousands of miles of pipelines that carry it to hundreds of thousands of homes and industries . . .

They are operational efficiency . . . sound fiscal policy . . . management's integrity.

These are the kinds of resources that enable the Columbia System to pledge public service to 1600 communities in an area supporting more than 5,000,000 people, for years to come.

COLUMBIA GAS & ELECTRIC CORPORATION

COLUMBIA SYSTEM

ASSOCIATIONS

A.G.A. Conference on Industrial and Commercial Gas

THE A.G.A. Conference on Industrial and Commercial Gas will be held at the Commodore Perry Hotel, Toledo, Friday and Saturday, March 29 and 30. Harry A. Sutton, chairman, Industrial and Commercial Gas Section, has announced that a full program which will appeal to all gas men and give them an incentive to develop opportunities for expansion in the industrial and commercial gas fields will be presented.

Highlighting the conference, will be the addresses at the luncheon sessions by Grove Patterson, editor of *The Toledo Blade*, and E. J. Boothby, A. G.A. president. The following are the subjects on the program and the speakers:

Sales Importance of Prepared Atmospheres—E. G. deCoriolis, Surface Combustion Corp., Toledo.

Water Heaters and Steam Boilers—Load Builders for Commercial Gas—O. W. Olson, Sellers Engineering Co., Chicago.

Advertising Paves the Way—J. P. Leinroth, chairman, Industrial and Commercial National Advertising Committee.

Cooking Problems in Public School Feeding Program — Margaret Crozier, manager, School Cafeterias, School District of Philadelphia.

Opportunities as Industrial and Commercial Sales Engineers—Franklin T. Rainey, The Ohio Fuel Gas Co., Columbus, Ohio.

Building Prestige and Sales in the Commercial Market — Leon Ourusoff, Washington Gas Light Co., Washington, D. C.

Protection Equipment on Gas Ovens—C. George Segeler, American Gas Association.

High Speed Direct Gas Heating—Frederic O. Hess, Selas Corp. of America, Philadelphia.

Interruptible Quenching — C. H. Lekberg, Northern Indiana Public Service Co., Hammond, Ind.

Heating by Immersion and Submerged Combustion—Charles C. Eeles, The Ohio Fuel Gas Co., Toledo.

High Temperature Indirect Heating—Ken W. Stockey, The Gas Machinery Co., Cleveland.

Where Do Gas-Oil Burners Fit In?—Otto Lutherer, The North American Manufacturing Co., Cleveland.

Getting the Small Tailor Boiler Load—Harry B. Wilson, The Brooklyn Union Gas Co., Brooklyn, N.Y.

Prepare for the Scramble for the Customer's Dollar—Walter C. Ayers; Brook, Smith, French & Dorrance, Inc., Detroit.

Heat Operations in the Plastics Industry.

A New Type Gas-Fired Brass Melter.

Are Your Retail Bake Shops Gas-Fired?

The Church Kitchen as a Market for Gas—Paul W. Craig, Equitable Gas Co., Pittsburgh.

A.G.A. Distribution and Motor Vehicle Conference

THE 22nd annual Distribution and Motor Vehicle Conference of the American Gas Association will be held at Hotel Stevens, Chicago, April 15-17. Due to the national emergency, the technical section conference was not held last year.

S. G. Page, chairman of the Motor Vehicle Committee, announces that his committee will hold two round table luncheon conferences to discuss motor vehicle problems. On Monday, April 15, Linn Edsall, Philadelphia Electric Co., Philadelphia, will preside, and on Tuesday, April 16, E. W. Jahn, Consolidated Gas Electric Light & Power Co., Baltimore, will lead the discussion.

The same arrangement for round table luncheon conferences is being planned by the Distribution Committee, according to J. H. Collins, vice-chairman. On Monday, A. V. Brashear, Michigan Consolidated Gas Co., Detroit, will guide the group in a discussion of Meters and Metering, and E. L. Henderson, United Gas Corp., Houston, will talk about Construction and Maintenance. On Tuesday the subjects will be Work on Customers' Premises led by J. M. Pickford, Northern Indiana Public Service Co., Hammond, Ind., and Pipe Coatings and Corrosion with R. F. Hadley, Susquehanna Pipe Line Co., Philadelphia, presiding.

The use of radio in gas distribution work will be one of the important subjects discussed. Current uses of radio will be discussed by gas company representatives and future possibilities of radio transmission will be revealed by The Bell Telephone Co., representatives.

Programs planned for other sessions during the conference are as follows:

JOINT SESSIONS

Distribution and Motor Vehicle Committees

Monday, April 15 *at* 10:00 *A.M.*

Opening Remarks— T. H. Kendall, chairman, Distribution Committee, Pittsbugh.

Address of Welcome.

A Message from the Association—E. J. Boothby, president, American Gas Association.

Distribution—A Vital Link—H. Carl Wolf, managing director, American Gas Association.

Use of Radio in Distribution Work—Two presentations are planned by leaders in their field on the practical application of radio, and what the distribution man can expect of the radio of the future.

Discussion.

Tuesday, April 16 *at* 9:30 *A.M.*

Opening Remarks—S. G. Page, chairman, Motor Vehicle Committee, Pittsbugh.

Air Compressor Tools—Their Maintenance and Repair—B. D. Connor, vice chairman, Motor Vehicle Committee, Boston.

Standardization of Motor Truck Bodies—Sidney F. Gale, chairman, New Orleans.

Safety Programs—An informative presentation is planned by the Accident Prevention Committee of the Association.

Motion Picture, "Gas"—A technicolor sound film, showing construction over difficult terrain of the longest large diameter gas pipe line in the world. The 24-in. line shown was constructed as a vital war project from Corpus Christi, Texas, to Cornwell, W. Va.—1265 miles in the record time of 292 days.

DISTRIBUTION CONFERENCE SESSIONS

Wednesday, April 17 *at* 10:00 *A.M.*
T. H. Kendall, chairman—
Distribution Committee, Presiding

Sacrificial Anodes — Dr. Kent M. Wight, research associate, American Gas Association.

Automatic Loading of District Governors—F. J. Woolfenden, engineer of distribution design, Michigan Consolidated Gas Co., Detroit.

Supervisors' Part in Industrial Relations—E. O. Keller, training supervisor, Philadelphia Co., Pittsburgh.

Discussion.

Reports of Committee Developments and Luncheon Conference Summaries

2:00 *P.M.*

J. H. Collins, vice chairman—
Distribution Committee, Presiding

Safety—L. K. Richey, chairman, Michigan Consolidated Gas Co., Detroit.

Construction and Maintenance—E. L. Henderson, chairman, United Gas Corp., Houston.

Meters and Metering—A. V. Brashear, chairman, Michigan Consolidated Gas Co., Detroit.

Pipe Coatings and Corrosion—R. F. Hadley, chairman, Susquehanna Pipe Line Co., Philadelphia.

Work on Customers' Premises—J. M. Pickford, chairman, Northern Indiana Public Service Co., Hammond, Ind.

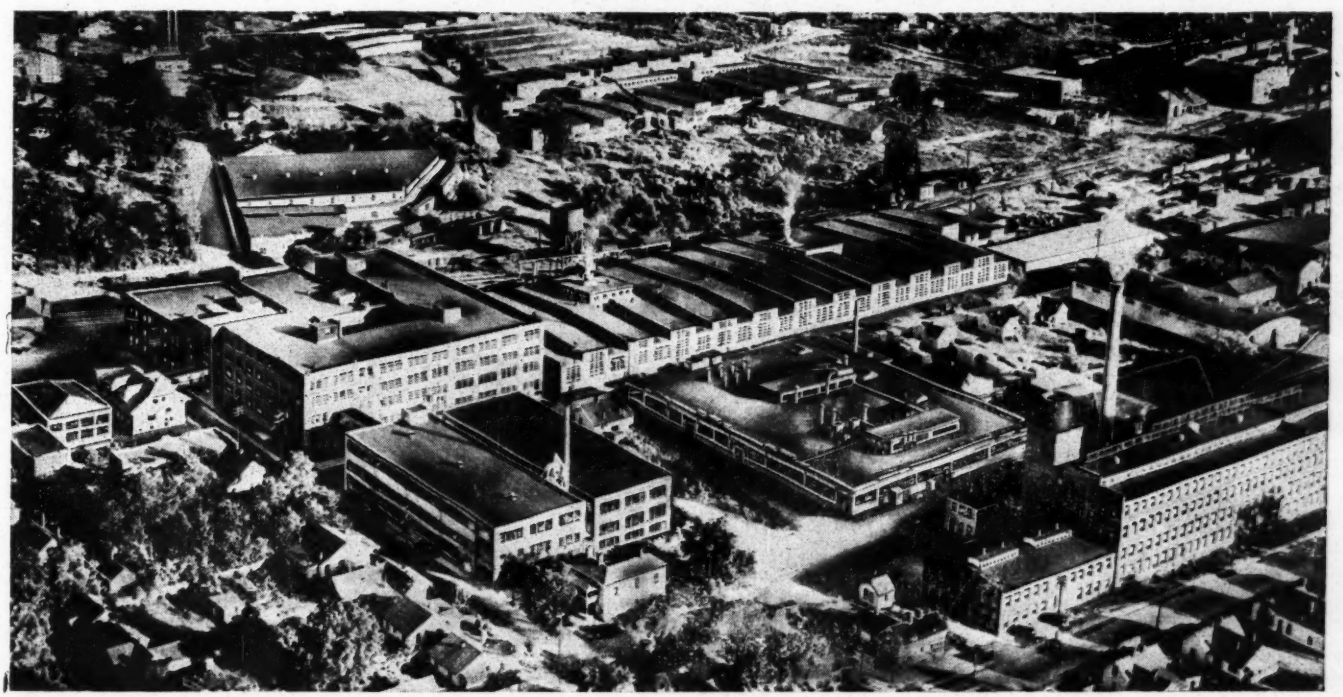
Open Forum.

TO LEARN THE FUTURE

STUDY THE PAST

IF you think that things are hard to get today, think back to 1879 when Hayes was President, the U. S. Treasury resumed redemption of greenbacks, and the South was prostrate after the Civil War. Food, shelter, clothes were scarce. Stoves were desperately needed; none were made in the South. Transportation was difficult and costly. To fill this desperate need, in 1879 the Hardwick sons in Cleveland, Tenn., employed a dozen neighbors and made a practical, 14 inch oven cook stove, pioneering stove manufacture in the South. From that day to this, in ever increasing volume for satisfied customers all over the nation, Hardwick has made good stoves at a price that people can pay. First in the South, Hardwick has held its lead by pioneering and perfecting efficient volume manufacture of gas ranges at low cost. Long ago Hardwick decided no machinery was worth a cent after someone invented a better piece of equipment. The result is 7 large plants, chock full of the most efficient equipment yet devised. At the end of this war, with demand again far exceeding supply, what do these facts mean to you? Hardwick production is steadily mounting, cannot at present fill your requirements. But this is the time for you to look at the record, look at the plant and the equipment, look at the vigorous and progressive spirit that will keep Hardwick ahead of competition. Then we believe you will agree that you can best insure your sales future by making Hardwick your featured line. In the future, as in the past, Hardwick will build ranges which equal in performance the highest priced ranges, build them well and efficiently, and price them for the volume market. You can gain and hold more customers by featuring Hardwick.

HARDWICK STOVE COMPANY



Membership Committee Appointed for A.G.A.

President E. J. Boothby of the American Gas Association has appointed a membership committee with J. N. Greene president of Alabama Gas Co., Birmingham, as chairman. The new committee will make an effort to secure the enrollment of the comparatively few non-member gas companies in an effort to make the Association as nearly 100% representative of the industry as possible. Other problems in connection with membership will be assigned to the committee for study and recommendation.

J. N. Greene

NEGA Annual Conference Scheduled for March 21-22

The 19th annual business conference of the New England Gas Association at Hotel Statler, Boston, March 21 and 22, will be the first the NEGA has held in over two years. The theme of the conference will be "New Problems Mean New Opportunities." There will be 16 different presentations on the program including a forum, a radio broadcast, and illustrations of the use of industrial gas in New England during the war. The presentations are divided into two main groups: (1) more or less technical subjects covering certain phases of the gas industry and (2) broad, non-technical subjects which would be timely before any association group.

A.G.A. Given Right to Use "Blue Flame" Trade Mark

For some time the American Gas Association has unintentionally been using in its advertising and promotional work "The Blue Flame" which has been trade-marked by Phillips Petroleum Co. and used for many years as the name of Phillips' publication "The Blue Flame," sent to its Philgas dealer organization. Phillips Petroleum Co. has now given the American Gas Association and its members permission to use Phillips' trade-mark "The Blue Flame" in its advertising and promotional activities.

A.G.A. and EEI to Hold Joint Accounting Conference

The American Gas Association and the Edison Electric Institute will hold a joint national accounting conference at the Netherland Plaza Hotel in Cincinnati, April 1-3. The discussions will cover such topics as national fiscal policies, current trends in accounting, developments affecting taxes and significant decisions by courts and commissions.

A.G.A. Requirements Groups Make Recommendations

Approval Requirements Subcommittees for domestic ranges, hotel and restaurant ranges, and water heaters met at the A.G.A. laboratories recently to consider additions and changes in requirements.

The range group initiated refinements for a new wall temperature test board to accommodate flush-to-wall models and authorized formation of a subgroup to prepare individual requirements for combination and bungalow type ranges.

The hotel range subcommittee reviewed comments from the industry on proposed revisions to requirements for hotel ranges and deep fat fryers. The water heater group recommended a new draw-off test to insure delivery of an adequate supply of hot water by automatic storage system.

CALENDAR

March

American Gas Association Midwest Personnel Conference—Kansas City, March 7.

Oklahoma Utilities Association 1946 Convention—Biltmore Hotel, Oklahoma City, March 11-12.

Southern Gas Association—Galvez Hotel and Bucaneer Hotel, Galveston, Texas, March 21-22.

New England Gas Association—Boston, March 21-22.

American Gas Association Conference on Industrial and Commercial Gas Section—Commodore Perry Hotel, Toledo, March 29-30.

April

Federal Power Commission's Natural Gas Investigation—Charleston, W. Va., April 2.

Mid-West Gas Association — St. Paul Hotel, St. Paul, Minn., April 8-10.

American Gas Association Distribution and Motor Vehicle Conference—Hotel Stevens, Chicago, April 15-17.

Southwestern Gas Measurement Short Course — Norman, Okla., April 23-25.

May

American Gas Association Natural Gas Department, Annual Spring Meeting—Hotel Gibson, Cincinnati, May 7-8.

National Association of Corrosion Engineers Annual Meeting—President Hotel, Kansas City, Mo., May 7-9.

Indiana Gas Association, Annual Convention—French Lick Springs Hotel, French Lick, Ind., May 9-10.

Pennsylvania Gas Association—Galen Hall, Wernersville, Pa., May 21-23.

June

American Gas Association Joint Production and Chemical Committee Conference—Hotel Pennsylvania, New York City, June 3-5.

National Fire Protection Association—Boston, June 3-6.

American Gas Association Midwest Personnel Conference—Kansas City, June 6.

Canadian Gas Association, 39th Annual Convention—Mannoir Richelieu Hotel, Murray Bay, Quebec, June 18-21.

October

American Gas Association Annual Convention and Exhibit—Atlantic City, N. J., Oct. 7-11.

A.G.A. Research Technical Advisory Group Formed

F. M. Banks, chairman of the A.G.A. Committee on Domestic Gas Research has announced the recent formation of a group known as the Technical Advisory Group for Burners, Controls and Accessories Research to develop and supervise new domestiic gas research projects in the burner and accessories field under the chairmanship of Dr. William R. Hainsworth, vice president in charge of engineering, Servel, Inc.

The members of this group which held its first meeting in December are: Philip S. Harper, Harper-Wyman Co., Chicago; B. A. Johnson, Minneapolis-Honeywell Regulator Co., Minneapolis; Deal Olds, The Coleman Lamp & Stove Co., Wichita, Kan.; Paul Sagar, General Controls Co., Cleveland; Lyman M. Van der Pyl, Pittsburgh Equitable Meter Co., Pittsburgh; and C. C. Winterstein, The Philadelphia Gas Works Co.

Non-Ferrous Committee Chairman Appointed

Harry A. Sutton, chairman, A.G.A. Industrial and Commercial Gas Section, announces the appointment of C. George Segeler as chairman of the non-ferrous metal committee. Segeler is utilization engineer of the American Gas Association, and has spent many years in investigations in the field of non-ferrous metals. Objectives of the committee include studies on melting practices and heat treating processes to evolve the most efficient procedures through the use of gas-fired equipment.

Revised Style Used In A.G.A. Research Bulletins

Three new research bulletins have been issued by the American Gas Association Testing Laboratories. Each features a new cover and typographical changes which have been made for better appearance and readability.

The new bulletins are: No. 38—Fundamental Data for Design of Totally Aerated Atmospheric Gas Burners, No. 39—Fundamentals of Heat Absorption by Utensils in Gas Range Ovens, and No. 40—A Study of Various Methods of Kitchen Ventilation.

Gild of Ancient Supplers Plans 1946 Gatherings

The Gild of Ancient Supplers has completed its 1946 organization and plans two major gatherings for the coming year. The first is the ninth anniversary dinner to be held at Galen Hall, Wernersville, Pa., during the May 21-23 convention of the Pennsylvania Gas Association. The other is the annual Convocation and Wassail at Atlantic City, N. J., during the week of Oct. 7 at the convention of the American Gas Association.

Canadian Association Resumes Conventions

The Natural Gas and Petroleum Association of Canada has scheduled its annual convention for May 22 and 23 at the Prince Edward Hotel, Windsor, Ontario. Joseph McKee, assistant secretary made this announcement Feb. 1. The convention will be the first since they were halted during the war.

CURRENT READING

Experimental Determinations of Vapor-Liquid Equilibria Between Natural Gas and 95% Diethylene Glycol—G. F. Russell, L. S. Reid and R. L. Huntington. "Petroleum Refiner," Dec., 1945, pp. 137-141. This experimental study which is related to the dehydration of natural gas by diethylene glycol was undertaken because of the need for equilibria data in the design and operation of high-pressure absorption plants. In the laboratory a concurrent vapor-liquid contactor was used for the dynamic mixing of natural gas with a glycol-water solution of known composition. The total water and glycol-vapor content of the natural gas was determined by absorption in anhydrous magnesium perchlorate, while separately the glycol vapor was absorbed in distilled water. The water-vapor content was calculated by difference. These equilibria data are presented as a ratio of the mol fraction of the component in the vapor phase to the corresponding mol fraction in the liquid solution. Both water and diethylene glycol equilibrium ratios exhibit minimum values at approximately 1500 psi, passing into the retrograde condensation range above this pressure. A rapid decrease in dehydration efficiency at pressures exceeding 2000 psi is indicated.

Corrosion-Resisting Plastic Material Applied to Oil-Field Equipment in Place—E. H. Short, Jr. "Oil and Gas Journal," Dec. 22, 1945, pp. 59, 60. At the present time it appears that the following list of oil-field items of equipment may be satisfactorily serviced with plastics in the field: 1. Oil-field storage tanks—internal and external; 2. Tubing; 3. Line pipe—oil and salt-water lines; 4. Complete saltwater disposal systems, including saltwater filters: 5. Sucker rods; 6. Valves, fittings, etc.; 7. Concrete floors in pump stations, power and compressor houses; 8. Wooden building materials; 9. Oil-field road mats (keeps moisture in wood and should prevent later absorption and subsequent decay). The method of application is described.

Research Paper RP 1664—Mass Spectrometric Analyses of Hydrocarbon and Gas Mixtures—A. K. Brewer and V. H. Dibeler. The basic principles underlying mass spectrometric analysis of hydrocarbon and gas mixtures are outlined. The method of calculating the composition from the mass-abundance records is described. Analyses of a number of hydrocarbon and other gas mixtures are shown. Whenever possible, comparisons with different methods of analyses are given. The reproducibility and the accuracy obtainable in mass spectrometric analyses are described.

Synthetic Ammonia Produced from Natural Gas—J. A. Lee. "Chemical and Metallurgical Engineering", Dec., 1945, pp. 94-96. In this article is told the story of the production of synthetic ammonia in one of the new plants in which natural gas is used as the source of the hydrogen. The purification system where the sulfur is removed, the reforming, converting and other operations in the preparation of the synthesis gas will be of particular interest to chemical engineers. The conversion of the synthesis gas to ammonia, and its separation and recovery follow standard practice. Also see flow sheet on pages 134-137.

How to Evaluate Supervisory Jobs—Albert N. Gillett. This manual answers in detail the following two questions: What is the supervisory job worth? How good is the man occupying that position? A kit of blank forms designed for actual use is included and makes the manual a practical working tool. 141 pp., 8½x11, loose-leaf gold stamped fabrikoid binder. $7.50 fob shipping point. Available from National Foremen's Institute, Inc., Deep River, Conn.

Factors Relating to Economics of Gas House Heating Study—Hall M. Henry. This 43-page report has been printed by the Post-War Planning Committee of the American Gas Association. Some sections of the reports have been printed previously in various trade journals, but it contains valuable supplements and additional data, including use of high Btu butane-air gas, methods for meeting peak loads and equipment costs to use LP Gases.

Hackh's Chemical Dictionary—a standard encyclopedic dictionary, contains over 57,000 entries including important additions and changes covering recent progress. The book is valuable for anyone seeking accurate and clear definitions of the theories, rules and laws of chemistry and the collateral vocabularies of science. Published by the Blakiston Co., 1012 Walnut St., Philadelphia 5. Price $8.50.

Cathodic Protection Controls Polarity to Buck Corrosion Current—L. P. Sudrabin. "Power," Nov., 1945, pp. 76-79. This method stifles the current flow that accompanies metal corrosion (electrochemical theory) by superimposing a regulated current flow from a properly placed special anode through the corroding liquid to metal surface protected.

Properties and Applications of Saran Pipe—D. R. Williams. "Chemistry and Metallurgical Engineering," Nov. 1945, pp. 112, 113. The resin from which this pipe is made is thermo-plastic vinylidene chloride-vinyl chloride copolymer combined with suitable plasticizers, pigments, and the like. Its properties and uses are listed, and data on available pipe sizes are included.

Hydrocarbon Thermodynamics—W. C. Edmister. "California Oil World," 2nd Nov. issue, 1945, pp. 11, etc. Practically all operations in hydrocarbon production, transportation, processing and consumption involve the conversion of energy from one form to another and, of course, some energy is always lost to the low-temperature heat sink, which may be the flue gas stack, the cooling water, the atmosphere, etc. It is obvious that thermodynamics is of paramount importance to technical men concerned with these operations. The objective of this paper is to summarize the fundamental concepts of thermodynamics, to review some of the important contributions made in the application of thermodynamics to hydrocarbons, and to outline the plan or pattern followed in developing thermodynamic tools for hydrocarbons. This discussion starts with the fundamental equations and stops with the procedure for developing working charts and tables.

Petroleum Production — Volume I, Mechanics of Production: Oil, Condensate, Natural Gas—Park J. Jones. This volume presents a system of mechanics of producing oil and condensate prior to the breakthrough of displacing fluids into producing wells. An attempt has been made to express physical facts in terms of the units and terminology used by the field personnel. Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y.

Solving Problems of Gas Pipe Line Design by Use of Significant Factors—C. L. Brockschmidt and M. K. Hager. This 12-page, illustrated booklet is available from Clark Bros. Co., Inc., Olean, N.Y. The discussion is supplemented by an appendix in which the pipe line flow equation of Panhandle Eastern Pipe Line Co. is developed.

Corrosion Protection of Steel Pipe by Resin Baking Coatings—"National Petroleum News," Dec. 5, 1945, pp. R-992, 994. While value of phenolic resins was earlier recognized, practical means for applying them to pipe were lacking which are now believed overcome through induction heating.

Playa Del Rey Oil Field Solves Gas storage Problem for Los Angeles Area—R. Sneddon. "Petroleum Engineer," Dec. 1945, pp. 51-56. To supply a swiftly mounting demand for war plants, an underground gas storage plan was executed. The plan is described and illustrated.

Combustion Protective Controls—D. A. Campbell. "Instruments," Dec., 1945, pp. 868-873. A discussion of various controls, and their installation and operation.

Grapeland Cycling Plant Operating Data—Frank H. Love. Reprinted from "Petroleum Engineer," June, 1945. This reprint, available from Clark Bros. Co., Inc., Olean, N. Y., shows what can be done with cycling by smaller independent producers. The 7-page discussion concerns the plant at Grapeland, Texas.

IOCC Speaker Chosen

Dr. E. R. Weidlein, Pittsburgh, Pa., director of the Mellon Institute of Industrial Research, will be a principal speaker at the spring quarterly meeting of the Interstate Oil Compact Commission at Tulsa, April 11-13, Earl Foster, Commission secretary announces.

PEOPLE

• **Edward Drew** has joined the American Gas Association as assistant director of promotion, it was announced March 1 by **H. Carl Wolf,** managing director. Drew, who has been active in promotional activities in banking and business circles for many years, will assist **Col. John H. White, Jr.,** director of promotion, in conducting industry-wide promotional campaigns and in coordinating sales promotion activities of the Association and its 412 gas utility company and 333 manufacturer company members.

E. Drew

Drew entered the banking field with the Union Trust Co., and in 1922 he joined the American Trust Co., San Francisco, serving as promotion and advertising manager and in other capacities before being elected vice president. As director of public relations, California Bankers Association, he conducted customers relations programs, organized business building campaigns and directed a 500-man speakers' bureau for the California Association.

• **A. A. Azar** has been appointed assistant sales manager of The Stacey Brothers Gas Construction Co., Cincinnati, one of the Dresser Industries. Announcement of his appointment was recently made by **A. E. Harvey,** vice president and sales manager. Prior to being employed by the Girdler Corp., Louisville, in the capacity of chief engineer of hydrogen processes and later as chief project engineer of the gas processes division, Azar was connected with the former Western Gas Construction Co., Fort Wayne, Ind. He was also previously connected with the Bartlett-Hayward Division of Koppers Co. as chief operating engineer.

• **George D. Wilkinson,** president of Cribben and Sexton Co., has announced the resignation of **F. J. Hoenigmann,** executive vice president and general manager. Hoenigmann became identified with the gas industry in 1930 when he came to Cribben and Sexton as sales manager. In 1940, he was made vice president and general manger. He was recently elected a member of the American Gas Association's executive board and chairman of the Association's manufacturers section. He is also chairman of the gas range division of GAMA.

• Rudd Manufacturing Co., Pittsburgh, Pa., has added **R. M. North** and **T. T. Smith** to its list of direct factory representatives. Returning to Ruud after service in the Pacific as a PT boat skipper, North will return to his prewar Indiana territory with headquarters in Fort Wayne. Smith, representative for Alabama, Georgia and Tennessee, will base his operations in Atlanta. He comes to Ruud from wartime service in Atlanta with the OPA. Smith formerly was associated with several Georgia gas utilities and was sales manager of the Macon Gas Co., just prior to the war.

• **S. B. Severson,** former vice president and general manager of the Republic Light, Heat & Power Co., Inc., and the Dominion Natural Gas Co., Ltd., was elected president and general manager of those companies at meetings of the directors Jan. 23.

Severson has been vice president of the Republic Light, Heat & Power Co., Inc., and the Dominion Natural Gas Co., Ltd., since 1924. At present he is first vice president and director of the Natural Gas & Petroleum Association of Canada, vice president and director of the United Fuel Investments, Ltd., Hamilton, Ontario.

John R. Reeves, general superintendent of the Dominion Natural Gas Co., Ltd., was elected vice president of that company to succeed Severson.

• **Dick Hassinger,** who covered some of the southern states for Day & Night Manufacturing Co., Monrovia, Calif., prior to joining the Army, is back again and is now sales representative for the central and south central states.

Alvin Flannes, who served during the war in the Merchant Marine, has returned to Day & Night and is representing the company in the southeastern territory with headquarters in Montgomery, Ala.

• **A. G. Koenig** has been named general sales manager of the C. J. Tagliabue Instrument Division at Brooklyn of the Portable Products Corp., Pittsburgh. Koenig succeeds **E. D. Wacker,** who had been previously appointed general manager of the Tag Division.

• **Emil Hofsoos,** vice president of Ketchum, MacLeod and Grove, Inc., has announced the appointment of **Ralph A. Hardy** as director of the gas appliance promotion division and **Donald B.** Wilkins as field representative.

• Two Army veterans have returned to Phillips Petroleum Co., Bartlesville, Okla., after doing ordnance work in the service. **Capt. Doyle D. Buttolph,** after four years in the Army, has returned as assistant manager, mechanical equipment division of the chemical engineering department. **Major E. Q. Beckwith** is manager of the product supply division, chemical products department, having served 3½ years in the Army.

• **Dwight S. Sargent** has been appointed personnel director of Consolidated Edison Co. of New York, Inc., succeeding **Dr. J. J. Wittmer** who recently became an assistant vice president. Sargent has been engaged in personnel work for the Edison System since 1922.

• **W. J. Foster,** former eastern manager, has been named vice president and general sales manager of the George D. Roper Corp. Foster's appointment was part of a move to strengthen the Roper sales staff in anticipation of plant expansion.

• **Eugene D. Milener** has been appointed coordinator of general research of the American Gas Association effective Mar. 1, it has been announced by **H. Carl Wolf,** managing dierctor. At the same time, **Mahlon A. Combs** was promoted from assistant secretary of the Industrial and Commercial Gas Section to secretary, succeeding Milener in this post.

E. D. Milener

Milener's new duties consist of coordinating the general and technical utilization research of the Association. In this capacity, he will continue to serve as secretary of the Coordinating Committee on Research, the Domestic Gas Research Committee and the Industrial & Commercial Gas Research Committee. Coordination of gas production research continues to be directed by **Edwin L. Hall.**

Milener joined the A.G.A. staff in 1928 in connection with the organization of the extensive program of research and development in industrial gas utilization which he has continued to supervise. In 1935, his responsibilities were increased to include a program of fundamental research in domestic gas utilization under the direction of the Committee on Domestic Gas Research. More recently he has taken on new duties as a result of the enlarged research program.

Combs has had 25 years' experience in the gas industry. A graduate of Stevens Institute of Technology, he began as a gas utilization engineer for Consolidated Gas Co. in New York, subsequently serving as sales engineer for Maxon Premix Burner Co. and American Gas Products Corp.

• **Kenneth R. Knapp** has been appointed assistant director of the A.G.A. Testing Laboratories in Cleveland and Los Angeles, **H. Carl Wolf,** managing director of the Association, announced today. He will serve as assistant to **R. M. Conner,** director of the laboratories, in supervising the testing and research activities conducted by two laboratories of the gas industry's trade association.

Knapp joined the laboratories in 1929 to take charge of pipe joint research, was appointed chief engineer in 1930, and held this position until his present promotion.

• The appointment of **Dr. Hugh L. Dryden** as assistant director of the National Bureau of Standards has been announced by **Dr. E. U. Condon,** director. **E. C. Crittenden,** who has served as assistant director for many years, will continue in that capacity. Dr. Dryden's services will supplement those of Crittenden. Dryden will continue as chief of the mechanics and sound division.

• **Clifford R. Hale** has been appointed general manager of purchasing and traffic for Rheem Manufacturing Co. it was announced today by **W. E. Zander,** vice president. His headquarters will be in New York. Hale formerly was vice president of Continental Industries, Inc., New York.

• **Dr. S. W. Martin,** research chemist who headed the chemical section of the Institute of Gas Technology, Chicago, since 1942, has been added to the technical staff of Portland Gas & Coke Co., to serve as assistant vice president in charge of new products development, it has been announced by **Paul B. McKee,** president.

Dr. S. W. Martin

An honor graduate of Williams College and Yale University, Dr. Martin was a research physical chemist with the National Lead Co. for seven years before going to the Institute, which is affiliated with the Armour Institute.

McKee said in announcing the appointment, "We are fortunate to be able to bring Dr. Martin to Portland to aid in carrying forward the industrial research program which has made notable progress under **E. L. Hall,** our chief engineer, and his associates." Products now being recovered by the company in its petroleum processing operations are benzol, xylol, toluol, tar road binders, electrode pitch, high grade petroleum coke, carbon briquets, and pure carbon.

• **H. L. Ley** has been appointed manager of construction and operation for the Kentucky West Virginia Gas Co., Ashland, Ky., **D. B. Beecher,** vice president and general manager, announced recently. Ley will supervise all matters pertaining to construction, operating and maintenance work and the work carried on by the land department.

P. E. Dufendach has been appointed manager of engineering and geology. He will supervise all engineering, geological and purchasing work. **O. C. Cornett** has been appointed purchasing agent for Kentucky West Virginia. Cornett will handle the purchasing of materials and supplies and insurance matters.

George W. Hereford has been appointed supervisor of gas measurement.

• Filling of several key positions in the United Gas Co. organization by promotion of veteran officials was announced recently by **H. C. McGowen,** president.

L. V. Tracht, assistant secretary and treasurer of the operating division in Houston, has been appointed treasurer and will be transferred from Houston to Shreveport. **R. E. Hull,** auditor of United Gas Pipe Line Co., has been appointed comptroller. **J. H. Miracle** is now secretary, **F. E. Waltrip** becomes general auditor and **H. W. Egger** has been named superintendent of compressor stations.

• The Ruud Manufacturing Co., Pittsburgh, has added **Carleton R. Cummings,** and **Gray L. Carpenter,** both recently discharged naval officers, to its advertising department.

Prior to the war, Cummings was with the advertising department of Proctor and Gamble, Cincinnati. Carpenter is former New York representative for the Classic Guild Ltd., a London publishing firm, and was at one time with the Knickerbocker Broadcasting Co. in New York.

• The election of **William E. Curran** as a director of the Rheem Manufacturing Co. was announced Feb. 19 at a special meeting of the board of directors in New York. He has been a vice president in charge of all manufacturing activities for the company since October 1943 with offices in New York.

After World War I Curran joined Republic Steel Corp. as chief chemist at Youngstown, Ohio, and later was transferred to that company's Birmingham Coke plant where he was made works manager in 1938.

Joining Rheem in April 1942, he managed plants at Birmingham, Danville, Pa., and Richmond, Calif., until his appointment as a vice president.

• Surface Combustion Corp., Toledo, announces the appointment of **Mark E. Ward** as a design engineer at its Columbus, Ohio, plant. Ward formerly was employed for 10 years at the American Gas Association testing laboratory, Cleveland, in testing, inspection, domestic and requirements gas research and in the war products department.

• **Charles E. Bennett,** president of The Manufacturers Light and Heat Co., Pittsburgh, has announced the retirement of **E. J. Egan,** vice president in charge of operations, effective April 1. Egan joined the company as a foreman at Steubenville, Ohio, and reached his present position, step by step, through promotions. He is a director of Manufacturers Light and Heat and of the Pennsylvania Natural Gas Men's Association.

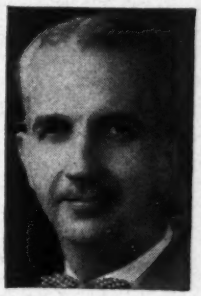
• **E. H. Coe,** president of Central Arizona Light and Power Co., has announced the appointment of **Henry B. Sargent** as executive vice president of the company. Sargent was formerly vice president and general manager of the Mississippi Power and Light Co. **Milton Sanders** becomes vice president in charge of sales, and **Don Willis,** manager of advertising and publicity.

• For "outstanding service" in solving manpower problems of the San Francisco Port of Embarkation during the wartime crisis, the Army has awarded the Legion of Merit to former **Lt. Col. Alan R. Bailey,** AUS, now personnel executive of the Pacific Public Service Co. Before the war, Bailey was assistant to the president of Coast Counties Gas and Electric Co., Pacific Public Service subsidiary.

• **John K. Knighton,** as manager of sales, will coordinate all sales activities on gas appliances and equipment for four recently organized product divisions of Servel, Inc. The four divisions are household refrigerator, air conditioning, water heater and kitchen accessories.

• **Alexander Black,** formerly of the Pacific Lighting Corp., Los Angeles, recently released by the Army Air Forces as a Lt. Col. after 45 months in the service, has joined the sales department of Solar Aircraft Co. Black will work with the petroleum industry branch of Solar.

• **A. J. Kerr,** formerly general sales manager, has been elected vice president of sales of the Rockwell Manufacturing Co., Pittsburgh, **Colone Willard F. Rockwell,** president and chairman, has announced.



A. J. Kerr

Kerr has been associated with the Company for more than 20 years. His early career was as district manager, Tulsa, for Pittsburgh Equitable Meter and Nordstrom Valve Co.'s now divisions of the Roockwell Manufacturing Co. In 1944 he was made general sales manager. As vice president of sales of Rockwell, Kerr will coordinate the marketing activities of the various subsidiaries and divisions.

• Cribben and Sexton Co. has announced the appointment of **Dr. Frederick Port** as chief engineer. From 1939 to 1942 Dr. Port was associated with the Republic Steel Corp. in Chicago as head of the combustion engineering department.

In 1942 he entered the Army as ordnance officer in procurement work. He was successively, resident ordnance engineer at the Studebaker Corp., officer-in-charge of Studebaker Proving Ground, and assistant chief of tank and automotive purchasing in the Chicago Ordnance District.

• **R. B. Harkins,** formerly personnel director, Panhandle Eastern Pipe Line Co., has assumed his new duties as assistant superintendent of pipe lines. His headquarters will continue to be in Kansas City. Harkins has been with Panhandle since 1931. In 1944 he organized the A.G.A. Midwest Personnel Conference.

• **L. M. Day,** former western division safety and operating instructor, Consumers Power Co., Jackson, Mich., has been appointed assistant division superintendent and acting division superintendent of the western division. Day has been with Consumers Power Co. since 1922.

• **A. M. Probst** has been appointed to represent Tappan Stove Co. in the Pittsburgh district, according to **A. L. Smith,** Eastern regional sales manager. Probst has been associated with the gas appliance promotion division in this district for a number of years.

• On page 76 of the January issue of GAS it was stated that **J. W. Moungey** had been selected purchasing agent and superintendent of stores of the Atlanta Gas Light Co. with headquarters in Mobile. The item should have stated that Moungey is with the Mobile Gas Service Corp., Mobile.

• **R. S. Agee,** vice president of Roberts & Mander Stove Co., Hatsboro, Pa., has announced the opening of a new factory branch office and showroom at 1 Park Avenue, New York City, where **John H. Emery,** new district manager for metropolitan and New York state areas, will make his headquarters. The showroom will serve as a training center for utility and dealer sales and service personnel.

Emery formerly was a partner in the Gale Engineering Co., serving the New York metropolitan and northern New Jersey areas since 1939. Prior to that time he was manager of the New York branch of the Sullivan Machinery Co.

• **James J. Deely,** business manager of Brooklyn Union Gas Co., announced the following appointments and reassignments, effective Feb. 1:

Joseph A. Reynolds, from acting retail sales supervisor to domestic sales manager; **John B. Frost,** from assistant industrial sales manager to retail sales supervisor; **Carl Below,** from district sales manager to supervisor, apartment house division; **Edward A. Koster,** from supervisor, apartment house and new development divisions, to supervisor, new development division; **Carlton W. Roll,** from industrial sales engineer to assistant industrial sales manager; **Henry A. Diekmann,** from coordinator to supervisor, house heating division; and **Richard G. Kopff,** from district sales manager to coordinator.

• **Gene Henry** has been appointed assistant to the sales manager in charge of American Kitchens for American Central Manufacturing Corp., Connersville, Ind., it was announced recently by **C. Fred Hastings,** general sales manager. Henry, who formerly was district sales manager in the South, will work with **Charles Stoup,** American Kitchens manager in Connersville. **Charles A. Reinbolt, Jr.,** who formerly handled sales promotion, has been appointed advertising and sales promotion manager.

• **J. F. Ray,** director of sales, General Controls Co., Glendale, Calif., has announced the appointment of **Edgar P. Hollister** as manager of the New York factory branch. Hollister, formerly associated with the Bendix Aviation Corp., will serve users of automatic pressure, temperature and flow controls in New York, New Jersey and Connecticut.

• **Edwin Fulton,** head of the sales service and promotion bureau of the Richmond, Va., city utilities department, has accepted an executive position with the Tampa, Fla., Gas Co., effective March 1.

• **Louis R. Quad** has been appointed division commercial manager, Public Service Electric and Gas Co., Elizabeth, N. J. Quad succeeds **Edward A. Driscoll,** who died recently.

• **George A. Wilson** has been elected president of the Interstate Natural Gas Co., Monroe, La., according to a recent announcement by the Standard Oil Co. of New Jersey, Louisiana division.

• **Major Paul L. Berno,** former sales representative and later sales promotion manager, Tappan Stove Co., has been named development manager for the company. Berno recently was placed on inactive status following three years and seven months with the Army Quartermaster Corp.

Seven sales representatives have been added to the Tappan staff, including three veterans. The veterans are **G. E. Connally,** assigned to Philadelphia; **John McLaren,** Georgia, Florida and Alabama; and **E. H. Jelliff,** southern Indiana.

The other salesmen are: **A. J. Bradley,** Michigan; **A. M. Probst,** Pittsburgh; **J. F. Loeffler,** New England; and **R. C. Smith,** New Jersey.

• **Edward H. Hegmann** has been appointed general auditor of the Philadelphia Co. and Subsidiary Co.'s, **C. T. Harmon,** controller, announced recently. Hegmann was formerly auditor of receipts. He entered the employ of the Philadelphia Co. as an accountant in 1937. **Lawrence J. McGraw,** former chief clerk of the Beaver Falls accounting department office, has been appointed auditor of receipts. He has been with the company since 1924. **Elmer J. Hadley,** who has served in various capacities with the company since 1918, has been appointed chief clerk, Beaver Falls.

• **Charles H. Sawyer** has been appointed research engineer, Eastern Gas and Fuel Associates, and will supervise the Koppers Coal Division service to customers. He will coordinate this work with that of the Koppers stoker coal research laboratory, which he has directed for some time, and will handle research in the coke and gas industry in collaboration with general research activities of Eastern Gas and Fuel Associates.

• **Mrs. Pauline Treisch,** former home service director for the Mansfield district of the Ohio Fuel Gas Co., has been named director of home service for the Tappan Stove Co., succeeding **Florence Windecker** who resigned.

Obituaries

• **Charles G. Laskey,** Shreveport, independent operator and builder of northwest Louisiana's first gas pipe line, died Feb. 22 in New Orleans at the age of 67. In 1927 Laskey formed the People's Gas and Fuel Co., and in 1928 was elected president of the Southwest Gas Utilities Corp., the consolidation of 15 Texas, Oklahoma and Louisiana companies. At that time it controlled 50,000 acres of proven gas land and more than 10,000 miles of pipe line.

• **Hubert P. Smith,** manager of the statistical department, sales and service, Philadelphia and Subsidiary Co.'s, died recently after a long illness. Smith entered the Duquesne Light Co. in 1924 as a cost analyst and has since served as chief of statistical bureau, director of rates and statistics, manager of rate division and manager of statistical department, sales and service.

• **Edward A. Driscoll,** division commercial manager, Public Service Electric and Gas Co., Elizabeth, N. J., died recently.

Senate Debate Continues on Big and Little Inch Lines

The Senate Petroleum (O'Mahoney) committee turned its attention to whether the Big Inch and Little Inch pipe lines should be sold to private interests for transportation of natural gas when it resumed hearings recently. Surplus Property Administration had recommended that the lines be sold or leased for transportation of oil or that the government operate them as common carriers for oil. That recommendation would have become effective Feb. 13, but the Senate approved a resolution extending the effective date of the SPA disposal plans for 30 days.

This extension was requested by the oil industry to permit it to gather evidence to support its position against SPA. The O'Mahoney committee is taking advantage of the extension to hold hearings to determine whether it should recommend that the Senate accept the SPA proposal or that the lines be sold to private interests for natural gas transportation.

Cooper-Bessemer Expands For South American Trade

M. C. Pollock, vice president in charge of export sales for the Cooper-Bessemer Corp., with plants at Mount Vernon, Ohio, and Grove City, Pa., has announced the establishment of a branch office in Caracas, Venezuela, to serve expanding markets in that country, Colombia and Peru. A recent survey of South American markets indicated a growing demand for diesel engines and engine driven compressors.

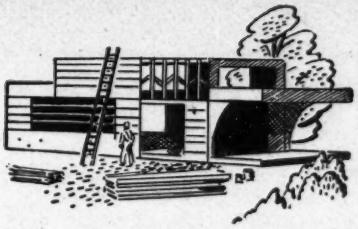
Thomas E. Kraner has been appointed branch manager in charge of the new headquarters. He has been affiliated with Cooper-Bessemer since 1937 and has been with its Washington office for the past six years.

Parker Appliance Co. Appoints Distributors

D. A. Cameron, manager of sales, Parker Appliance Co., Cleveland, announces the appointment of a number of manufacturers' supply firms as distributors of Parker industrial fittings and tube bending equipment. Stocks of Parker products are being established in 20 principal cities from coast to coast as the first step in a program to broaden the company's service to manufacturers. Parker technical service engineers will be made available on request for consultation on the design and application of fluid power systems.

Temporary Certificate Issued To Meet Winter Demands

The FPC has issued a temporary certificate to Kentucky Natural Gas Corp., Owensboro, Ky., authorizing it to operate an existing pipe line connection in Barren County, Ky., in order to receive from the Tennessee Gas and Transmission Co. a maximum of 6000 Mcf of natural gas per day to meet winter peak demands. The certificate will be terminated as of April 1 unless extended by order of the Commission. The only new facilities required are the installation of heavy weight gate valves on Kentucky's 6-in. connecting line.



Planning to Build this Summer?

When you are making plans for a new home or for the remodelling of your present home, be "fussy" about the capacity of your gas furnace and the location of the heat outlets, the cold-air return and the wall thermostat. This is most important.

P·G·and E· RECOMMENDS

If you are planning a new home or modernizing your present one and you need help on house heating, come in and consult with one of our gas heating specialists. He will work with you, your architect and heating contractor to help you get a heating installation tailored to your home and your pocketbook. Use this Free Service. It will save you time, worry and money.

You will want your home comfortably warm on the chilly days of the cold-peak weather season. You will want plenty of heat, rapidly circulated for quick comfort in every room. You will get this from an automatic, forced-air Gas Heating System that is properly installed, and when you use such a heating plant, you will save money every heating hour.

When cost estimates come in and you look them over, choose the heating system that is engineered to do a first-class job of heating your home. What you might save by "skimping", you will pay for later on with less heating comfort, quickly worn-out equipment and higher fuel bills.

Remember, a furnace will produce only so much heat; it cannot be forced beyond the capacity its builders gave it.

P·G·and E· PACIFIC GAS AND ELECTRIC COMPANY

G203-346

Type of ad published by P. G. & E. in Northern and Central California newspapers.

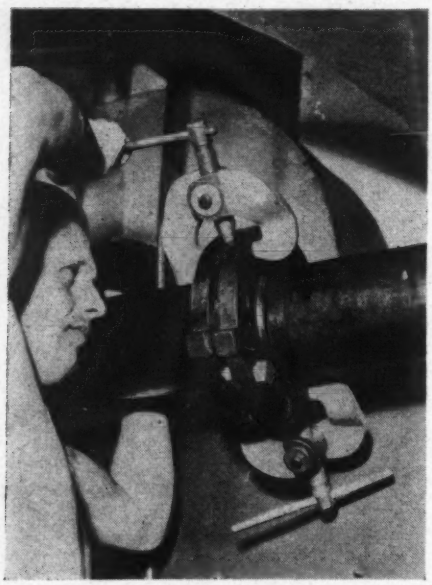
NEW PRODUCTS

Flange Opener

T. G. Persson Co., 224 Glenwood Ave., Bloomfield, N.J.

Model: Flange-Jacks.

Application: This new tool opens pipe flanges for gasket renewal quickly, easily and safely, eliminating the hazardous hammer and chisel method. Pipe flanges may be opened or closed without damage to flange faces and without danger from sparks. The Flange-Jack operates with a minimum of labor and is important in cramped locations. It exerts tremendous pressure smoothly and evenly eliminating vibration along the pipe line and the possibility of causing new leaks in nearby joints. It is capable of opening joints against a load of 15 tons and bolt holes are maintained in continuous alignment.



Description: Flange-Jacks are simple in design—jaws are heavy, one piece steel forgings, screw points are case hardened. Standard size opens all 2-in. to 20-in. flanges and holds them in perfect alignment.

Internal Plating Process

Bart Manufacturing Co., Inc., 227 Main St., Belleville 9, N.J.

Model: Bart Lectro-Clad Process.

Application: For electro-plating the inside of steel pipe with nickel or other metals to make it corrosion resistant. Especially useful in production or handling of petroleum, chemicals, foods, textiles, plastics, coke and gas, glue, gelatin, paints, varnishes, sugar, paper, pulp, dye stuffs, glass and ceramics.

Description: The relatively inexpensive process develops a smooth, ductile, pore-free nickel deposit fully adherent to the base metal and can be applied to pipe or tubing up to 18-in. diameter, in random lengths approximately 20 ft. It combines the corrosion resistance of nickel with the low cost, strength and fabricating characteristics of steel. Fittings and pipe line accessories are available for complete piping systems. The internally plated pipe can be welded, reduced and bent, hot or cold, without destroying any portion of the internal lining.

Gas Detection And Analysis Instruments

Davis Emergency Equipment Co., Inc., 45 Halleck St., Newark 4, N.J.

Model: Extended line of gas detection and analysis instruments.

Application: Safety equipment for detection and analysis of combustible gas or vapor in air for the measurement of gas or vapor air mixture from the characteristics of explosion. Will also detect and analyze any one gas, whether combined or not with other gases.

Description: These new gas detection and analysis instruments are the result of the granting of an exclusive license to manufacture and sell special thermal conductivity cells. The detection of any one gas in a mixture, for purity or proportioning, will be possible, as will the analysis of flue and exhaust gas. All the new instruments will be available with direct reading meters or circular chart or strip chart recorders, or with recording and control equipment.

Adhesive Gasket

Products Research Co., 634 S. Western Ave., Los Angeles 5, Calif.

Model: Chrome Lock Gasket.

Application: Approved by the Navy and shipbuilders and has been installed in the ventilation and forced draft blower systems of many ships. It is now recognized as suitable for practically any type of gasket use because of these advantages: flame resistance, fuel resistance, rust-inhibition, anti-wicking, lamination, non-oxidation, compressibility, longer life, cushioning and ease of handling.

Description: The gasket offers adhesion to metals without cementing to the flange, assuring a positive seal. An adhesive back makes it unnecessary to tie, lace or tape the gasket onto vertical or inverted flanges. These adhesive back gaskets have a crinolin liner upon which the template may be laid and scribed or marked with a lead pencil. Quantities of gaskets may be cut at one time and stacked in parts bins without danger of sticking together or collecting dirt. Chrome Lock Gasketing is supplied in four types—two without adhesive back and two with it—and is packed in both rolls and slit rolls.

Self-Lubricating Valve

Lancaster Valve Co., Lancaster, Ohio.

Model: Waddell Self-Lubricating Plug Valve.

Application: The plug valve completely lubricates all its moving surfaces so operators no longer need be concerned with lubricants and grease guns to assure the free play of the valves, whether used frequently or where only an occasional turn is made to check their operation.

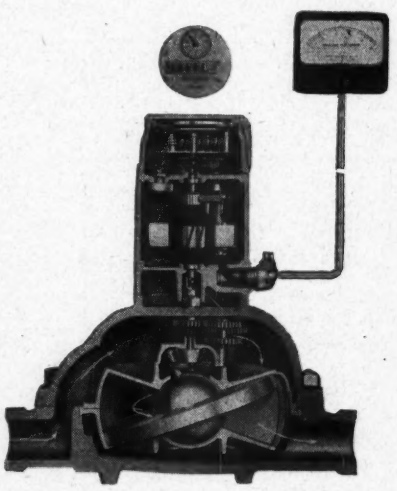
Description: Hydraulic force assures a complete flow of lubricant to every moving surface each time the valve is given a quarter-turn to open or close. The immense pressure exerted by the piston assures a complete flow of the lubricant. To prevent lubricant from entering the line, the channels are so designed that they never open into the line flow, regardless of the position of the valve. An asbestos packing plate resists burning and the valve will not leak if expcsed to fire.

Indicating Flow Meter

The Hays Corp., Michigan City, Ind.

Model: Hays Veriflow Meter.

Application: For measuring, indicating and totalizing the flow of oil, testing hydraulically operated mechanisms, the flow of water in chemicals in continuous manufacturing processes, the flow of fuel oil to oil burning furnaces and boilers, the flow of a heating or cooling liquid and the blending of two or more liquids. Some unusual liquids that have been successfully measured by the new meter are lacquer, tar, molasses, chocolate, rosin, soap, paint and varnish.



Description: The outstanding feature of the new meter is its ability to indicate the rate of flow at a point remote from where the meter is installed. This is in addition to the rate of flow indication in the meter itself. No external source of electricity is required because the indicating meter measures the output of the generator and is calibrated to indicate the corresponding rate of liquid flow through the meter. The scale of the indicator can be calibrated to read in any values of flow desired, such as gallons per minute.

There's No Guesswork
in
UNIVERSAL GAS RANGES

For three generations Universal Gas Ranges have eliminated all elements of chance from both dealers and customers. The dealers know that proven performance has always been a watchword and a standard requirement. The customer knows that top quality is a proven accomplishment and that beauty parallels performance.

There is not even any guess-work in the markets that are available to dealers everywhere. Many millions of homes possessing old style, worn-out stoves form only one part of the market, while millions of new homes yet to be built offer new possibilities for all.

YESTERDAY—
TODAY—
TOMORROW—
THE LEADER:
UNIVERSAL GAS RANGES!

T1-36

Catalogs

• **Air Reduction,** 60 East 42nd St., New York 17, N.Y.—A 12-page booklet illustrates and describes a complete line of accessories for all types of arc welding machines and operations. Types of equipment covered include: electrode holders, graphite electrodes, welding cable, cable connectors, and cable lugs. A section is devoted to Airco Heliwelding equipment for welding magnesium. Copies of this booklet may be obtained by writing to Air Reduction for catalog No. 130.

Also available at this address is catalog No. ADG-2017 describing the Silbraz Joint, the threadless connection that bonds copper tubing and brass pipe into a single "one-piece" pipe line. Silbraz Joints are made from patented bronze pipe fittings, valves and flanges, containing a factory inserted ring of silver brazing alloy in each port opening. This is an illustrated, 16-page booklet.

• **Stacey Brothers Gas Construction Co.,** 5535 Vine St., Cincinnati 16—A 50-page bulletin (W-45) giving a comprehensive picture of the design and construction of wet seal gas holders is available on request. Gives engineering data on welding technique, pressure, painting surface, corrosion, and general dimensions of all sizes of gas holders up to 10 million cu. ft. The bulletin details the construction methods from the laying of the bottom to installing the tank shell, holder sections and guide frame.

• **Taylor Instrument Companies,** P.O. Box 110, Rochester 1, N.Y.—This firm has issued two catalogs recently. The first deals with the application of control instruments to the refrigeration field. It is divided into two sections covering applications and instruments. Write to the above address for catalog No. 300.

The second catalog, bulletin No. 98161, describes the purpose, construction and operation of the Taylor Level-Buoy indicating controller. This instrument features pointer indication of level which is mechanical and independent of controller air supply, frictionless and leakless Taylor Torque tube transmission of float movement to instrument mechanism, and Taylor Fulscope control in any of the five standard forms.

• **Morganite Brush Co., Inc.,** Long Island City 1, N.Y.—This firm has issued a folder describing Morganite liquid meter valves and slides which are available in diversified grades and compositions for high temperatures, pressures, and speeds. The folder includes a thorough discussion of applications, physical and chemical characteristics and a list of advantages claimed by the manufacturer. Copies are available from Morganite Brush Co., Inc.

• **Selas Corporation of America,** Erie Ave. and D St., Philadelphia 34—Bulletin 251-B on the Selas Superheat burners has been revised and reprinted and is available at the above address. This bulletin describes the use of Selas burners for flame hardening, flame annealing, brazing, preheating, de-scaling and other localized open heat treatments.

• **The Bristol Co.,** Waterbury 91, Conn.—Bulletin PB1228 gives full details concerning the adaptation of a standard model of the Pyromaster Microact Controller (recently announced) to the special requirement of two-stage firing of gas furnaces. Diagrams are included.

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STREET CITY ZONE STATE

PIPE LINE NEWS

• The Federal Power Commission has consolidated six applications of the **Northern Natural Gas Co.** for hearing March 11, in Chicago. The applications request authority for construction and operation of a number of proposed facilities estimated at $7,886,076, in Iowa, Kansas and Nebraska to meet requirements of firm customers and to sell gas at wholesale to a number of communities without natural gas service at present. Also included in the hearing is an application asking permission to use facilities constructed to serve **Iowa Electric Light and Power Co.'s** Boone power plant to transport additional gas to be distributed by Iowa Electric Light and Power Co. to retail consumers in Boone, Iowa.

The applications seek authority to construct the following facilities:

1. A 450-hp gas compressor station near Otis, Kan.; a 2400-hp compressor station near Cherokee, Iowa.

2. Installation of two 1000-hp compressor units at the Sublette, Kan., station; a 900-hp compressor unit at the Oakland, Iowa, station; and an 800-hp compressor unit at the South Sioux City, Nebr., compressor station.

3. Construction of about 156 miles of 24-in. loop line; about 11½ miles of 20-in. loop line, about 40 miles of 18-in. loop line and about 6½ miles of 12¾-in. line. The various loop lines will effect a double pipe line system between compressor stations and thus increase the capacity of the present lines.

4. Construction of a number of small-diameter lines to Webster City, Madrid, Granger and Grimes, Iowa; Belle Plaine, Jordan, Janesville and Dunnell, Minn., and Murdock, Nebr., to enable Northern Natural to supply gas at wholesale for retail distribution in these areas.

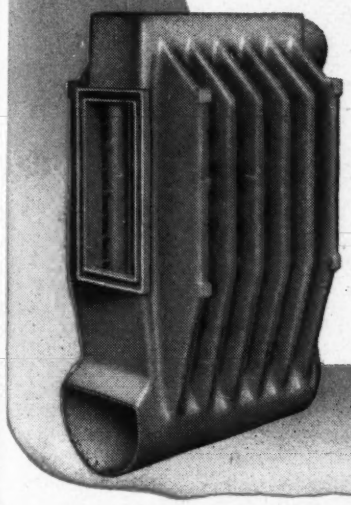
5. Construction of a 2-in. side valve connection with necessary appurtenances on the 18-in. gas transmission line as well as measuring and regulating station in the vicinity of Mynard, Nebr.

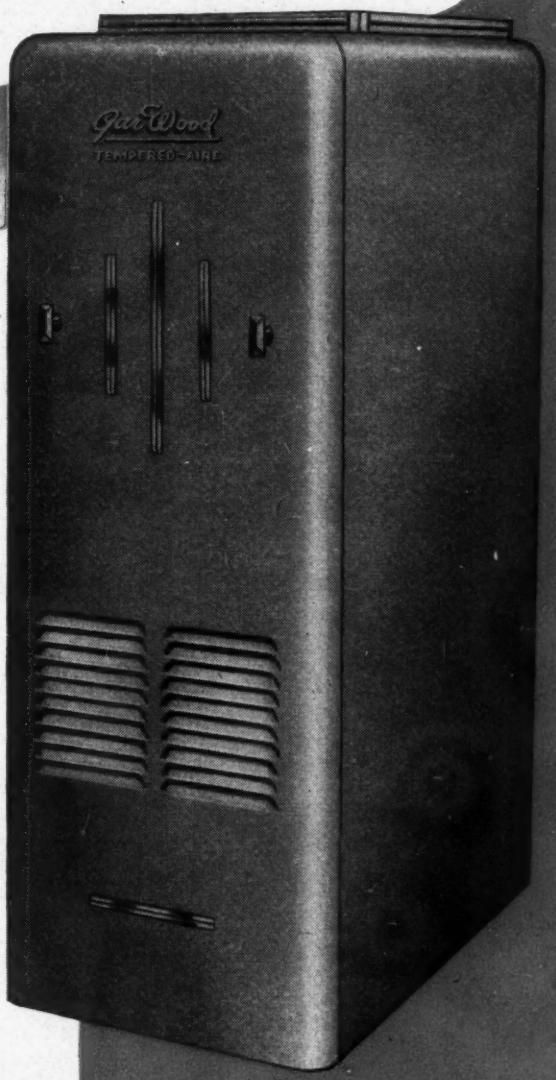
The above facilities are requested in addition to the approximately 50 miles of 24- and 20-in. pipe for which a certificate was issued to meet winter demands during 1945-46 following a hearing on Dec. 3, 1945.

• **Tennessee Gas and Transmission Co.,** Houston, last month sought FPC approval to construct and operate additions to its main pipe line extending

This ALL CAST-IRON HEAT EXCHANGER makes Gar Wood Gas Fired TEMPERED-AIRE

Easier to Sell!





The long-life, high-efficiency cast iron heat exchanger is the very heart of Gar Wood gas fired Tempered-Aire. With this in mind, Gar Wood engineers have carefully considered each factor in the development of this important unit. Cast iron, the choice of Utility Company engineers, was selected because of its great durability. The firebox was made large enough to avoid flame impingement and resulting hot spots. The triangular-shaped vertical channelways contain cast-in baffles which direct the hot gases laterally against the side walls in their upward course to the collecting chamber at the top. The overall shape and construction are designed to promote a maximum of heat transfer resulting in an exceptionally high efficiency. These and many other noteworthy features make Tempered-Aire a sound investment for any home owner. Tempered-Aire is easy to sell.

This advertisement describes postwar equipment which is not now available. It does not constitute an offer to sell or deliver and no suggestion is made that orders be solicited. This notice will cease to apply when ceiling prices have been established by the O.P.A.

GAR WOOD INDUSTRIES, INC.

HEATING DIVISION • DETROIT 11, MICHIGAN

Canadian Distributors: Engineering Industries, Ltd.,
282 Dupont St., Toronto, Ont.

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SMALL GAS UTILITIES CAN PROFIT BY USING BUTANE OR PROPANE

If you are confronted with the high costs of labor, equipment and maintenance for manufacturing gas for a small city you can be sure of an excellent and dependable service, by converting with little expense to Liquefied Petroleum Gas.

Many utility gas companies are including Warren's broad experience, engineering advice and consultation service in planning to convert operations to Liquefied Petroleum Gas.

The small additional plant investment and a minimum of labor, repairs and replacements combine to provide profitable operation. Warren's greatly expanded facilities provide increased production and delivery service adequate to meet your needs. Investigate Warren's products and services today—without obligation.

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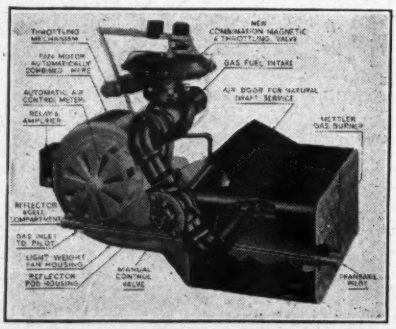
IS THE WORD FOR "FAN-AIR" BURNERS

Designed to fit a modern-day need the Mettler "FAN-AIR" Burner enables the small plant owner to have the benefits of mechanical draft automatic performance, at moderate cost. It can also be operated under natural draft conditions. Here is noiseless, troublefree combustion.


NEW COMBINATION MAGNETIC & THROTTLING VALVE
GAS FUEL INTAKE
AIR DOOR FOR NATURAL DRAFT SERVICE
METTLER GAS BURNER
TRANSMISSION PILOT

LEE B. METTLER CO.
406 SOUTH MAIN STREET ★ LOS ANGELES 13, CALIFORNIA

from Hidalgo County, Texas, to Clay County, W. Va., to enable it to meet increased demands of its customer companies. The proposed facilities which will raise the capacity of its delivery system 117 MMcf per day, to a total daily capacity of 381 MMcf are estimated to cost $29 million and will be financed partly out-of-pocket and partly by the sale of first mortgage bonds, preferred and common stock, and bank loans.

The additional facilities proposed are:

1. Three new compressor stations to be located in Victoria and Montgomery Counties, Texas, and Natchitoches Parish, La., with a total capacity of 25,000 hp.

2. About 410 miles of 26-in. and 24-in. main line loop at intervals along the existing 24-in. main pipe line.

3. Eighteen new compressor units totaling 19,000 hp in existing compressor stations.

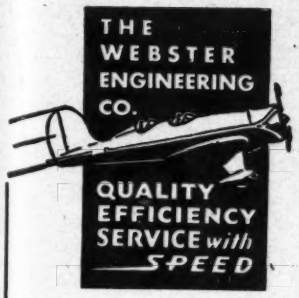
Firm contracts for the sale of a total of 346 MMcf of natural gas per day are being or have been negotiated with United Fuel Gas Co., Hope Natural Gas Co., Louisville Gas and Electric Co., Tennessee Natural Gas Line, Inc., and Kentucky Natural Gas Co.

If the certificate is approved, Tennessee intends to begin construction immediately and hopes to have the project partially completed for operation by Dec. 31, 1946.

• Hearing has been set by FPC for March 18 in Washington, D.C., on applications of **Hope Natural Gas Co.**, Clarksburg, W. Va., and **The East Ohio Gas Co.**, Cleveland, for authority to construct new gas transmission facilities. Hope requests authority to install three new compressor units, one of 2000 hp at the Hastings compressor station, Wetzel County, West Virginia, and two 500-hp units at the Jones compressor station in Gilmer County; a dehydration plant at the Cornwell compressor station in Kanawha County, dehydration plant additions at the Jackson compressor station, Kanawha County; about 55 miles of 12¾-in. pipe line from the Jackson compressor station extending into Wyoming County; and a number of loop lines, one of which will connect with the facilities of **The East Ohio Gas Co.** at the West Virginia-Ohio state line. The construction cost is estimated at $5,237,500.

East Ohio proposes to construct a 144-mile line from Hope's outlet at Pipe Creek on the Ohio River to the vicinity of Cleveland to alleviate gas shortages.

• Hearing on an application of the **West Texas Gas Co.**, Lubbock, for authority to operate facilities constructed under a temporary certificate began March 8 in Washington, D. C. The overall cost is estimated at $160,466. The facilities are needed to serve the estimated peak demand of 50,800 Mcf per day during the 1945-46 heating season. To prevent delay in construction, the temporary certificate was granted by the Commission and the facilities, including 11 miles of loop line in Hale County, Texas, and a 400-hp. compressor unit at the company's station in Randall County, Texas, have been completed and put in use. The purpose of the additions is to provide more adequate service to customers in Texas which include about 44 communities.



Good engineering is still of prime importance not only in the designing and manufacturing of combustion equipment, but in the actual Installation of the burners.

Webster combustion equipment and engineering are the products of eighteen years of successful experience in serving the petroleum industry.

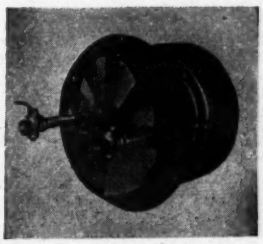
A Webster engineered combustion installation is a guarantee of satisfactory performance.

●

WEBSTER Series 200

Radiant Gas and Combination Burner

An especially designed combustion unit for installation in oil stills, power boilers and furnaces. Circular design allows the instillation of a greater capacity burner in the same wall area.



Recommendations and drawings furnished without obligation

THE WEBSTER ENGINEERING COMPANY . . . Tulsa, Okla.

Division of **SURFACE COMBUSTION . . . . . Toledo, Ohio**

Representatives—CATLETT ENGINEERING, Inc., Dallas • F. J. EVANS ENGINEERING CO., Birmingham, Houston
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• E. A. BROWN COMPANY, Omaha, Neb.

Customers like its
NEAT APPEARANCE!

AND good looks are only one of the many advantages of Transite Flue Pipe!

Light in weight, Transite Flue Pipe can be cut to size on the job, goes up readily, requires little support. It is rustproof, needs no paint.

Transite Flue Pipe is furnished in round and oval shapes, in sizes for all normal requirements. A complete line of fittings, couplings and other accessories is available.

* * *

For full details, write for booklet TR-13A. Address: Johns-Manville, 22 East 40th Street, New York 16, New York.

Johns-Manville

TRANSITE FLUE PIPE
For venting gas-burning appliances

WANTED TO BUY
USED 5 FT. PROVERS

•

WILL PAY TOP PRICE FOR YOUR SURPLUS 5 FT. METER PROVERS.

Describe quantity, make, condition.

Write Box 120, G A S
1709 W. 8th St., Los Angeles 14, Calif.

OPEN FORUM

CONTROL DEVICES

Here are Some Suggestions as to Industrial and Measuring and Control Devices which Might be Developed to Perform Specialized Services for the Gas Industry.

ONE of the postwar needs of the gas utility business will be new industrial measuring and control devices to perform specialized services. Following is a brief description of three such devices which would prove useful.

1. Flow Meter

A flow meter, to measure volume of a compressible liquid such as natural gas, that will give a rate and total record directly in standard cubic feet —without the necessity of calculating by use of complicated orifice meter coefficient, or correction of volume displacement meter for pressure and temperature.

Examples of Usefulness: Would eliminate the time and personnel now used for calculating volumes of gas, from orifice meter charts, after bringing into office from field.

Would enable field and plant operators to read flows directly from meter chart, for valve adjustment and setting and process control, without necessity of guessing, or calculating volume from chart which now shows only static and differential pressure.

2. Water Vapor Content or Dewpoint Meter

A recording device that will show either absolute water vapor content, or dewpoint at given pressure, of gas passing a sample point, operation of which will not be interfered with by impurities such as dust or dirt, and which will not react to or cause non-water dewpoints such as light hydrocarbon dewpoints.

Examples of Usefulness: Many industrial processes, such as drying, dehydrating, humidifying, air-conditioning, furnace atmosphere control, require a knowledge of water vapor content of gas or air streams. Also desirable for gas transmission line operation, to operate dehydration plants, drip pots, etc., and generally to control internal corrosion and hydrate formation.

No apparatus is now on market that will furnish accurate and dependable record or even indication.

3. Odor or Smell Meter

A recording device which will show the odor intensity or level at a sampling or observation point in arbitrary units or index numbers that can be related to average human nasal perception.

Examples of Usefulness: For control and record of adequacy of odor of odorized natural gas.

To establish the degree of odor emitted from an industrial plant, such as a gas manufacturing plant, for purposes of non-annoyance of public, compliance with public ordinances, prevention of loss of valuable material from plant, avoidance of escape of poisonous fumes, etc.

Odor perception is now the only human sense perception that cannot be mechanically or instrumentally duplicated or at least approached. It is of great industrial importance.

HOT WATER

A Reader Asks: "How Many Gallons per Hour of Water at What Temperature will the New Electric Automatic Dishwasher and Laundry Require?"

In the January issue of G A S there appeared an article by G. M. Rhode, Jr., of the Ruud Manufacturing Co., which spoke of the increased water heating load that may accrue to the industry through the widespread use of the electric automatic laundry and dishwashing machines.

It is generally conceded that the modern housewife in using these appliances will need a greater continuous supply of hotter water than has on the average been heretofore available. This is borne out by the recent recommendation of the Pacific Coast Gas Association that a 30-gal. heater be considered the minimum requirement for houses with one bathroom and one or two bedrooms.

It is understood, however, that some water heater manufacturers, while they recognize that larger volumes of hot water will be required, do not agree that this requirement will be a relatively instantaneous one; nor do they agree that the water need be any hotter than that which is now ordinarily provided. In fact, some are saying that there is no problem and that any increase in load will not be beyond the capability of the current design of water heater.

Disagreement within the industry on this highly important point should be clarified. Someone should authoritatively state how many gallons per hour of water at what temperature these new appliances will require.

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MACNICK CHART CLOCKS are hermetically sealed, protected against all enemies; uninterrupted service is assured, and repair costs are lowered to almost zero. These clocks fit practically all instruments using circular charts, thus enabling you to reduce your clock inventory to the minimum. Thousands in use by major companies.
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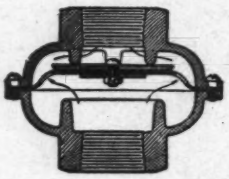

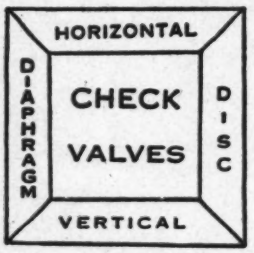

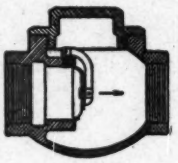

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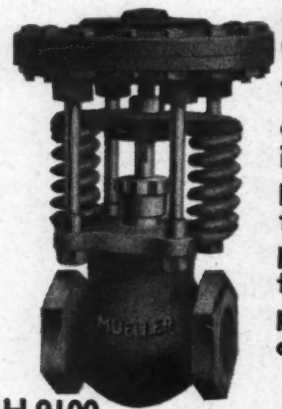

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This MUELLER Regulating Valve is ideal for control of boiler pressures where gas or oil is used for fuel. The phosphor bronze diaphragm has a large area, and is sensitive to the slightest changes in boiler pressures. The power created by this large diaphragm area, together with the full seat opening assures positive operation and fully controlled flow of fuel to the boiler.

H-9100

DECATUR, ILL. **MUELLER CO.** LOS ANGELES, CALIF.

National Metal Exposition Attracts Gas Men

One of the features of the National Metal Congress and Exposition, held Feb. 4-8 in Cleveland and attended by more than 45,000 visitors, was the Industrial Gas Breakfast for 150 gas men and 15 editors and representatives of metal magazines. The breakfast was presided over by Harry A. Sutton, Public Service Electric & Gas Co., Newark, who is chairman of the Industrial and Commercial Gas Section of the A.G.A.

A talk tracing the history of the use of gas in steel making from early English open hearths up to the present time was given by Dr. George B. Waterhouse, professor of metallurgy, Massachusetts Institute of Technology. E. L. Shanner, editor in chief of Steel, gave a short background of the achievements in metallurgy and contributions made to the war effort by metallurgists, as well as the postwar possibilities in this field.

The Industrial Gas Center, sponsored by the East Ohio Gas Co. and the American Gas Association, was another feature which attracted a number of gas sales engineers, equipment manufacturers and editors of trade magazines. The Center featured a background of photo enlargements of gas-fired industrial installations and an illuminated chart, "The trend continues to gas."

Tappan Issues Booklet On Kitchen Planning

Tappan Stove Co.'s New Freedom Gas Kitchen booklets, supporting the A.G.A. promotional program, have been mailed to retailers, utility executives and home service personnel.

The theme is convenience, attractiveness and individuality and the kitchen plans are adaptable to the various income brackets. Tappan's kitchen plans feature four things: (1) ventilation, (2) step-saving arrangement, (3) cheerful colors, and (4) feeling of fine living.

Further information regarding Tappan's kitchen planning program can be obtained from D. S. Sharp, assistant sales manager.

Nemec Combustion Expands

F. A. Nemec, head of Nemec Combustion Engineers, Whittier, Calif., announces the addition of 4000 sq. ft. of floor space to the present plant, making a total of 30,000 sq. ft. available for production facilities. This addition has been made available to handle increased production of burners and regulators. New equipment is also being added.

During the war, the Nemec organization was in full production on rockets and jet propulsion equipment. Much of the knowledge gained for this work is being utilized in the manufacture of gas-burning equipment.

FPC Postpones Hearing

The hearing in the FPC investigation to be held in Charleston, W. Va., has been postponed from March 19 to April 2. The hearing will be conducted in the House of Delegates Chamber, State Capitol building.

Operating Conditions Vary But

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REYNOLDS Builds a Regulator for every type of Gas Control Installation. Proved by records of performance in actual operation, or by records of factory tests on new developments, every REYNOLDS unit—whether for high pressure or low—is a proved product.

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- High Pressure Service House Regulators: Straight Lever Type—Models 10-20 Series. Toggle Lever Type—Model 30 Series
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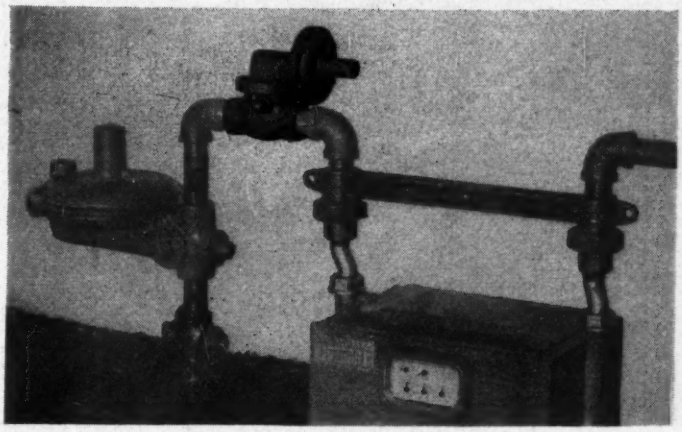
GAS CONTROL SINCE 1892

SENTRY

Automatic Low Pressure SHUT-OFF VALVE



Saves Man Hours and Fire Damage Claims

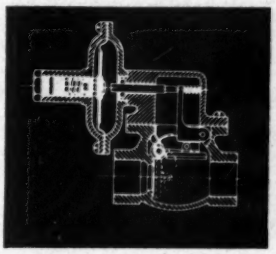
The Sentry Low Pressure Shut-Off Valve is installed at the inlet side of the gas meter.

Set to any predetermined pressure it instantly and positively shuts off service when pressure in the main falls below the setting selected. Gas stays off without leakage until the valve is manually reset.

All fire hazards due to leakage from pilots and appliance jets, flames of which have gone out from decreased or interrupted pressure are eliminated.

No longer is it necessary to close a district in case of partial outage as the Sentry Valve permits pressure to be raised safely.

In case of complete outage all services are automatically closed eliminating the time and expense of doing this manually. After line service has been restored only one trip is necessary to reset valve and service appliances.



The Sentry Valve was developed in close cooperation with leading gas authorities.

Engineering data and results of exhaustive dependability tests will be sent on request.

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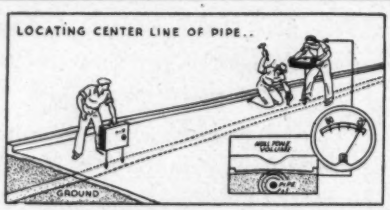

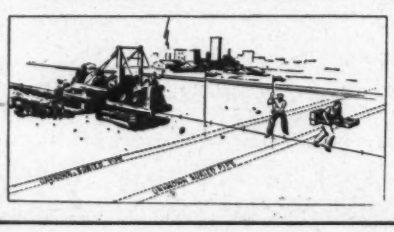

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FPC Issues 1944 Statistics On Natural Gas Companies

Statistics of Natural Gas Companies—1944, a report containing financial and operating information on 116 gas companies which reported an aggregate book investment in gas plant of $1,970,499,175 as of Dec. 31, 1944, has been released by the Federal Power Commission.

The information in the new publication was taken from annual reports of natural gas companies to the FPC for the calendar year 1944. The companies for which data are shown are limted to those which, for administrative purposes, have been determined to be natural gas companies within the meaning of the Natural Gas Act. The compilation does not contain information on all such companies, however, as the jurisdictional status of certain companies remains in question.

The report contains data as to balance sheet; income and earned surplus accounts; gas operating revenues, customers, and sales; gas operating expenses; gas plant investments; gas account; gas reserves; and field and transmission systems. The 116 companies served a total of 3,676,189 natural gas customers, of which 1323 were other gas utilities and the remainder ultimate consumers.

The report is priced at $1 a copy and may be obtained only from the Federal Power Commission, Washington 25, D. C. For convenience in ordering, the new publication may be referred to as FPC S-44.

Rockwell Subsidiaries Hold Management Conference

A conference unique in industrial management was held in Pittsburgh recently when the operating heads of the divisions and subsidiaries of Rockwell Manufacturing Co. met to coordinate their manufacturing, engineering, research, purchasing and marketing facilities.

W. F. Rockwell, Jr., vice president and general manager of Rockwell, who conducted the meetings, explained that the expanding peacetime production of the widely scattered plants made it difficult for the plant managers to keep abreast of new developments within other plants. He added that one of the biggest advantages of the Rockwell organization is the integration of manufacturing facilities and exchange of "know-how." Through exchange of information on problems, the company hopes to stabilize employment, lower costs, expand markets and find short cuts to more efficient operation.

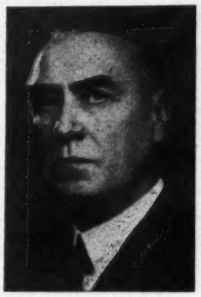
Odorant Recommended For Washington, D.C., Gas

Henry W. Blalock, formerly a member of the Arkansas Public Utilities Commission, predecessor of the Arkansas Public Service Commission, has suggested to the Public Utilities Commission of the District of Columbia that an odorant used by Arkansas gas distributors be added to gas in the District.

Blalock, who is now associated with the Federal Power Commission in Washington, made the suggestion after several asphyxiations had occurred in the Washington metropolitan area.

Columbia Gas & Electric Combines Two Groups

Stuart M. Crocker, president, Columbia Gas & Electric Corp., has announced that two of the Columbia System's operating groups will be combined under one management April 1, 1946. The Binghamton, N. Y., group will become part of the Pittsburgh group, with headquarters in Pittsburgh.



C. E. Bennett

Charles E. Bennett, president of the Pittsburgh group, will head the expanded operations, and Irving K. Peck, president of the Binghamton organization, will be vice president and general manager of the combined properties. W. P. Sadler, treasurer of the Pittsburgh companies, will be elected a vice president on April 1 and will supervise financial policies of the enlarged group. J. V. Colley will succeed Sadler as treasurer.

Rate Reduction Ordered For Penn-York Natural

The Federal Power Commission announced Feb. 28 its order and opinion directing Penn-York Natural Gas Corp., Buffalo, N.Y., to reduce its wholesale rates for natural gas sold in interstate commerce for ultimate public consumption by $53,200 a year. The order applies to 1550 MMcf of gas estimated to be sold to Republic Light, Heat and Power Co., Penn-York's only customer company. Republic distributes gas in New York State.

Penn-York is ordered to file a new rate schedule for the transportation and sale of natural gas at wholesale which will reflect the rate reduction to be effective on all bills rendered after March 15, 1946.

Present Helium Gas Supply Is Adequate for Demands

Helium gas reserves at Shiprock, N. Mex., will remain in the ground unless an unforeseen need for them arises. Officials of the Bureau of Mines have stated that the war built helium-extraction plant at Shiprock will be maintained on a stand-by basis only, since production at the Exell plant near Amarillo is meeting current needs for the gas. The extraction of helium at Exell is in the nature of a conservation process, since there it is mixed with natural gas which is produced for fuel, and if the helium were not removed it would be wasted. Helium at Shiprock, on the other hand, can be preserved in the ground indefinitely.

East Ohio Cited by FPC

The Federal Power Commission has directed The East Ohio Gas Co., Cleveland, to show cause why it should not be considered a "natural gas company" within the meaning of the Natural Gas Act and why it should not be cited for failure to comply with FPC regulations under the Natural Gas Act. Hearing has been set for March 18 in Washington, D.C.

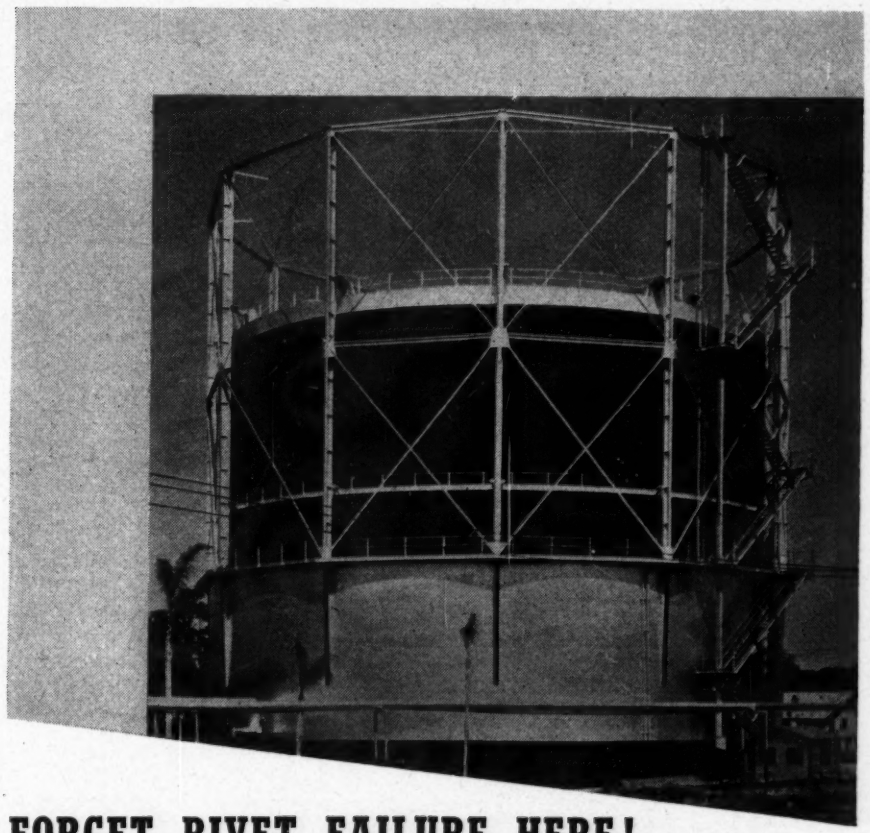
The show cause order issues from investigation by FPC begun in 1939 into the cost of transportation of natural gas by East Ohio from the Ohio River to the city gate of Cleveland, originally instituted upon a request of the City of Cleveland. East Ohio, the show cause order says, has consistently refused to furnish data necessary to determine the original cost of its properties, contending that it is not a "natural gas company" within the meaning of the Natural Gas Act. The cities of Euclid and Lakewood, Ohio, have also filed petitions requesting investigation and the three petitions will be heard at the same time as the show cause proceedings.

Gas Field Discovered By Texas Company

The Texas Co. has discovered a new California gas field in Yolo County, northwest of Sacramento. A test of 3,030,000 cu. ft. through a 3/8 in. choke was made on a recent test. Total depth of the well is 4022 ft. Production is coming from gun perforated intervals at 2570-80 ft. and 2612-20 ft. Shut in pressure is 984 lb.

Gas Co. Changes Name

The Kansas-Nebraska Gas Fuel Co., Lexington, Nebr., has changed its name to The Nebraska Natural Gas Co., according to F. P. Dicus, general manager.



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Whether your needs are standard—or unusual—there's a Stacey Brothers Holder, *custom built* to fit your requirements. No problem is too tough for us—or too routine. We'll take *complete* responsibility for design, manufacture and erection. That way you save both time and money. We make it our business to deliver dependable, economical holder capacity. May we submit our quotation and recommendations, based on your own specifications and drawings?

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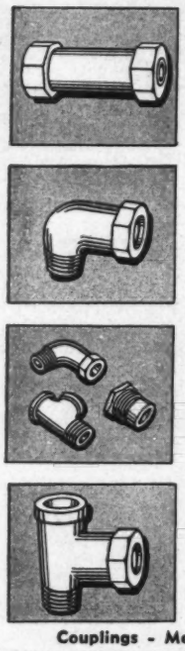

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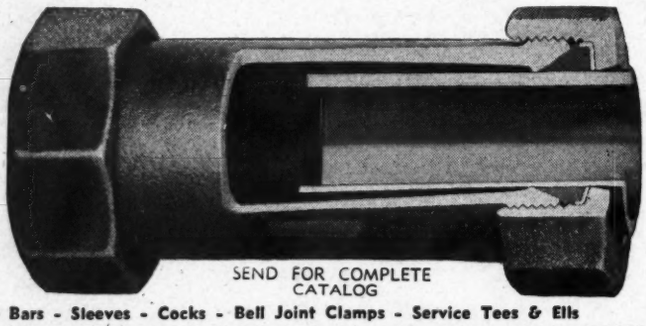

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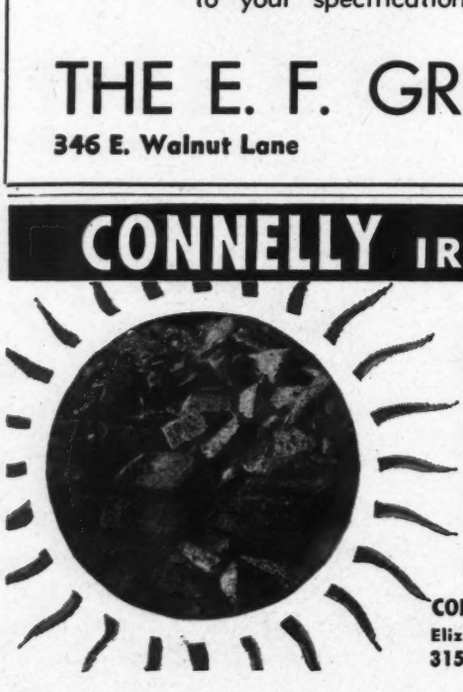

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Minnesota Seeks Natural Gas To Develop Steel Industry

James W. Clark, St. Paul, executive director of the Minnesota Resources Commission, told the Federal Power Commission recently that if natural gas could be piped into the northern Minnesota iron mining area, there could be an iron processing industry as well as iron mining. Clark, testifying at an FPC hearing on the Midwest natural gas situation, said Minnesota was very ambitious to have a steel industry but cannot do so because of a lack of cheap fuel. He expressed the belief that any natural resource in the nation should be available to all states.

Texas Commission Tests Heyser Field Gas-Oil Ratio

Tests of the gas-oil ratio of each well in the Heyser field, Calhoun County, Texas, were started Feb. 1 by the Texas Railroad Commission in an effort to reduce waste of casing-head gas. A special committee of engineers said the average ratio of the field is 4072 cu. ft. of gas per barrel of oil. It recommended a 2000 to 1 maximum. The committee said negotiations are in progress to build a $1,115,000 cycling plant to gather casing-head gas from all wells in the field, extract liquids from it, and sell the residue to gas pipe lines.

Union Gas System Seeks FPC Approval on Line Purchase

Union Gas System, Inc., has asked the FPC for permission to operate a small gas pipe line system, now owned and operated by The Independent Industrial Gas Co. and The Veeder Supply and Development Co., in the vicinity of Coffeyville, Kan. The purchase contract would be effective as of Jan. 1, 1946, and the agreed price is $150,000. Union claims the proposed operation would augment present supplies of gas and improve service without affecting rates or charges.

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